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STATIONARY SPRAYING PLANTS FOR THE ORCHARD.

SOME INITIAL LOCAL EXPERIENCES.

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THERE are many factors to be taken into account in the prosecution of a successful orcharding business. These include soil, situation, varieties and classes of trees, training and cultural methods, and a reasonably reliable and conveniently situated market; but the primary factor of all is the production of a good clean crop of fruit. Even where this is secured it is not always possible, owing to other handicaps under which the orchardist may have to labour, to make the venture a complete success, but without clean fruit no grower, however favourably situated otherwise, can feel safe or satisfied in this work.

At the present time spraying is recognized to be the one great practical means of disease-control available to the orchardist. Although possibly the ideal formulas have not yet been devised, considerable advancement during recent years has been made in this direction, with the result that the sprays now available can be held to be reasonably effective for the several purposes for which they are intended, if correctly applied.

Great improvements have also been made in the means of application of sprays. Development along this line has ranged through all stages, from the hand-syringe to the latest spraying outfits resembling

miniature fire-engines. But, notwithstanding the latter very effective machines, a further change is likely to become general—in fact, in some parts of the fruitgrowing world this is already the case. I refer to the adoption of stationary spraying plants, several of which have recently been installed in this country.

The development of fruit-culture and the science and practice of orcharding made the use of high-powered spraying plants essential, but with their advent it was found that other unavoidable factors militated against their complete success. Machines of the kind referred to are heavy and cumbersome, and traction difficulties over cultivated ground are not inconsiderable. Following a spell of wet weather, however, particularly if the contour of the land is to any extent uneven, the difficulties become practically unsurmountable until the soil has had some time to dry.

In the control of fungous diseases it is not only necessary to have available an efficient fungicide, but it is equally essential that the fungicide be applied at the correct time. A high humidity is favourable to the germination and growth of fungi, and as the humidity frequently is high following wet and showery weather in the spring and early summer it naturally follows that the danger period often occurs under circumstances that make an otherwise efficient spraying outfit unworkable. These conditions have no doubt tended very materially to the development of stationary spraying plants, for by this means there need be no delay after rain. Further, the work can be rushed through far more quickly, as it is possible to have many more nozzles at work than is practicable under ordinary spraying methods. There are many other possible advantages attending this system as against the use of the mobile power sprayer, not the least of which is the better condition in which the soil can be kept as against the packing that takes place through the hauling of a heavy outfit over wet puggy land.

Stationary spraying means the spraying of an orchard with the engine that provides the power installed at a fixed point. Pipes are laid systematically throughout the orchard, and the material forced through under high pressure. The pipes consist of mains and laterals. The laying of these is largely governed by the shape of the orchard and contour of the land. More is said regarding this in the reports which follow, but the object is to economically yet adequately cover the whole area. Laterals are taken out from the mains at suitable distances apart. There is no fixed rule as to this, but the following general directions should serve.

The first lateral is placed between the fourth and fifth rows of trees, and the remainder along every eighth row from the first throughout the extent of the main. A short standpipe fitted with tap and hose connection is taken up from the lateral close in to the tree-trunks, the first from under the fourth tree from the main, and the remainder every eighth tree from the first throughout the extent of the lateral. Thus sixty-four trees can be sprayed from each standpipe. Of course, an adequate length of hose is required to enable this to be done. Stop-cocks are fixed at the base of each lateral adjoining the main. By this means the spraying-material can be confined to that portion

of the orchard that is being sprayed, thus avoiding the necessity of filling the whole system.

There is still some doubt as to the size of pipes best suited for this purpose. In the State of Washington, U.S.A., where stationary spraying plants are in almost general use, the mains are generally of 1 in. piping, while some are as large as 1¼ in., and the laterals ¾ in. In this country, so far, the mains do not exceed ¾ in., while some are as small as ½ in., and the laterals range from ½ in. to ⅜ in. The larger the piping system the greater the wastage of spraying-material when spraying is completed. At the same time, although the larger pipes are dearer and the cost of installation correspondingly higher, less engine-pressure is required to pass an equal quantity of material through these pipes, and consequently there is a reduced strain on the system. No doubt the small pipes adopted in the Nelson District, even down to the ⅜ in. size, are so far allowing of ample pressure and are giving complete satisfaction, but the strain on the system must be very great. Having this in mind, the possibility of corrosion in the future and further reduction of the carrying-capacity of the pipes make the ⅜ in. pipe a doubtful proposition, and nothing less than ¾ in. mains and ½ in. laterals is recommended.

Several different makes of engines are being used for producing the necessary power. There are some available specially fitted up with pump attached, but any reliable make of engine of 2½ horse-power and upward should serve the purpose.

There are two distinct practices in connection with the stationary-plant system. One is known as the dead-end and the other the circulating system. The latter requires more piping and is therefore more costly to install, but it has the advantage that the material can be kept moving, and consequently there is less liability of the spraying-materials separating while in the pipes, and possibly less likelihood of corrosion; the saving of a certain amount of spray that would otherwise be lost is also effected. However, local orchardists who have adopted the dead end system claim that it is quite satisfactory, and if properly manipulated little loss or settling out is likely to occur. While reason suggests that the circulating system would be the most satisfactory, experience alone, which is at the present time lacking, can determine the point.

The following reports from Messrs. J. H. Thorp and G. Stratford, Orchard Instructors at Nelson and Motueka respectively, give accounts in some detail of what is being done regarding stationary spraying plants in the Nelson Province.

MR. THORP'S REPORT.

Hurst and Stewart's Orchard, Redwood's Valley.

In this orchard there are approximately 28 acres of trees served by pipe-lines through a total length of pipe measuring about 11,000 ft. In half of the area ¾ in. piping has been laid down, and in the other half ¾ in. mains with ½ in. laterals radiating from them. In actual working the difference in pressure is not great, sufficient pressure being obtained for all practical purposes in either part. Length of pipe from the pumping-stations varies from 80 ft. to 2,440 ft. At the

latter distance, with a pressure at the pump of 280 lb. on the gauge, the pressure at the nozzle is 175 lb., and at the closest point approximately 280 lb. Thus the loss of pressure by friction is about 100 lb. at the farthest point when spraying with one nozzle, and slightly less when three nozzles are operating. But ample pressure is secured to do all that is necessary, and from the appearance of the volume being delivered from the nozzles one would hardly notice the difference.

The working plant consists of a 500-gallon concrete tank, connected to which is a Bean duplex pump driven by a 2-horse-power Lister engine, which drives the pump with ease. The ¾ in. main pipe is on the surface of the ground at the highest level of the orchard, and each lateral is equipped with a gate valve, by which means the spray material can be directed down any lateral on which the spraying requires to be done. The hose connections are placed nine trees apart, as also are the lateral pipes, so that eighty-one trees can be sprayed at each shift of the hose. The laterals are buried to a depth of 15 in. near the centre of the lands, and short pipes extended to the tree, with an upright piece of pipe to which the tap is affixed for connecting the hoses. The latter are approximately 120 ft. long, and the nozzles deliver about ¾ to 1 gallon per minute each.

The installation of this plant is on the dead-end system—that is, there is no circulation of the spray material except such as is secured by the velocity of the mixture through the pipes to the nozzle, no return to the spray-tank of the surplus mixture being provided for.

Where only lime-sulphur solution is being applied this will be quite right, but it has yet to be decided what will take place when arsenate of lead is added. There are many doubts as to whether the arsenate of lead will settle in the pipes instead of reaching the trees at the longer distances, and a warning has already been given by Messrs. Chamberlain and Stannard, who used the dead-end system last season, that the lead would not remain in suspension long enough to reach the farthest points from the pump. In their case, however, the material was being pumped uphill, while with Messrs. Hurst and Stewart's plant the material is being pumped downhill all the time. In the case of Messrs. Chamberlain and Stannard, it may be mentioned that their system this season has been changed to a circulating one by joining up one lateral to the other and returning a pipe separately to the tank; and a test of the spray mixture of arsenate of lead discloses the fact that the difficulty of settling out of the lead has been practically eliminated.

Mr. Stewart, who has charge of the orchard of Messrs. Hurst and Stewart, is enthusiastic over the results obtained with their plant, as it has enabled him to get the spray on his trees during the recent wet weather when it would have been impossible to get on to the land with horses and spray-pump outfit. With three hoses going it is estimated that the orchard of 28 acres, with 4,500 trees, will be sprayed quite comfortably in three eight-hour days, when the land is worked down, as the hoses will be more easily handled than can be expected over roughly ploughed ground under wet conditions.

Messrs. Chamberlain and Stannard, of Nelson, above referred to, were the pioneers of the piping system in their orchard at Waimea

West, having had 12 acres of their area piped last year. In this orchard the piping is all $\frac{3}{4}$ in., and laid on the surface of the ground, which means that cultivation can only be done one way of the land and the ground cannot be cross-worked.

Stewart Estate Orchards.

Mr. W. R. Hoddy has installed a $\frac{3}{4}$ in. main with $\frac{1}{2}$ in. laterals, and has connected his ordinary spray outfit of $1\frac{3}{4}$ horse-power to same at the top of his orchard of 11 acres. He is entirely pleased with the result. In this case there are no gate valves in the laterals, which Mr. Hoddy now regrets, as he considers it would be more satisfactory to have them, and is already proposing to insert them into the pipes.

Mr. W. H. Ballinger, of Wellington (5 acres), and Mr. A. G. Ballinger (10 acres), whose orchards Mr. Hoddy supervises, have also installed the piping system on the same lines as Mr. Hoddy. In each case it will be worked with the latter's portable outfit.

Mr. R. Simpson has installed a $\frac{1}{2}$ in. piping system on 7 acres of Mr. W. H. Simpson's orchard, the driving-power being a Fordson tractor geared down to suit. He is high in praise of the results obtained and the benefit derived by being able to get on with the spraying as soon as rain has ceased.

On the sloping clay loam country this latter feature alone is a tremendous advantage, as it is sometimes impossible to get over the lowest lying parts for several days with a spray outfit, which is disastrous when fighting black-spot. Added to this is the detrimental effect on the land which is occasioned by the repeated movement of horses and spray-cart over the wet land.

General.

From the foregoing it will be seen that the stationary form of spraying is going to be popular, and there is much to commend it. But there is still much to prove as to which are the best methods to adopt, such as the question of dead-end *versus* circulating systems to secure agitation of combined sprays; to what length of piping the dead-end system can be trusted to ensure suspension of materials, and through what size of pipes; the minimum power required to drive the plant, and which size of pipe, according to the area of orchard and lay of country, will then be the most suitable; also many other details which are varied in the present installations in this and adjoining districts. For instance, it may not in all cases be necessary to put the pipes under the ground. I consider that where the trees are large and the branches stable the pipes might be run overhead through the trees with gate valves and tap connections in convenient positions and always accessible; if $\frac{3}{8}$ in. piping is satisfactory the weight would be very little on the trees. A great deal of information will be available by the end of the season on the subject, and orchardists who intend to go in for the piping system should make opportunity to inspect some of those plants in actual operation, so as to avoid mistakes and obtain definite information regarding details.

MR. STRATFORD'S REPORT.

T. C. Brash's Orchard, Mariri.

The system installed in this orchard is that known as the dead-end, being made up of mains and laterals, but no return to the tank as with the circulating system. It is thought that with the small pipes used, both for mains and laterals, the spray material will be kept in circulation, giving no time for settling; but this has to be proved. I am inclined to think that a certain amount of settling will occur, especially with arsenate of lead. The main pipes are $\frac{3}{4}$ in., and the laterals $\frac{3}{8}$ in., the main being laid due east and west, with laterals running from the main north and south. The pumping plant is placed in a gully, where water is available, there being steep inclines on either side. It is doubtful if sufficient pressure will be obtained on the ridges, and the placing of the pumping plant at as high a level as possible is advisable.

The plant is the Friend 4 horse-power, obtained from the Fruit-growers' Federation, and to all appearances a good outfit, being very compact and running very easily, and there should be no trouble with the working. A magneto has been put in instead of the battery as supplied, as a magneto is held to serve the purpose more satisfactorily. The plant sits on a concrete bed, and takes up very little room.

By the side of the plant is an 800-gallon wooden tank for the mixing of the sprays, thorough agitation being given by three fans driven by the engine. Outside the pumping-station a water-tank holding 600 gallons is placed and connected with the spray-tank inside. This water-tank is kept continually full from the water in the gully. From the spray-tank the spray is driven into the main and laterals, which run underground at a depth of from 10 in. to 12 in., and about 2 ft. from the fruit-trees. A short connecting-piece, the same size as the laterals, at every fifth tree, brings the lateral about 1 ft. above the surface of the ground and as close to the tree as possible. Ordinary household taps are attached to the ends of the laterals.

To prevent any bending of the lateral by the possible pulling of the hose when spraying at the farthest distance away, a stout piece of wire is run through a piece of hose and fastened to the tree. To assist in disconnecting under pressure, an attachment is placed on the ends of the hose, which can be easily unscrewed from the tap when shifting from one tap to another. This attachment also, by means of a shut-off, keeps the spray in the hose while the operator is walking from one tap to another. Stop-cocks are placed on both mains and laterals, so that no spray can travel up the pipes when spraying is not being done in any particular part of the orchard. A length of 100 ft. of light hose is used, enabling spraying to be done to the fullest extent without using the whole length of the hose.

A stationary plant is also being installed in Mr. J. H. Thorp's orchard at Braeburn.

E. T. James's Orchard, Tasman.

This installation is on the dead-end principle, and actual spraying was in progress while I was present. The mains are only $\frac{1}{2}$ in. pipes and the laterals $\frac{3}{8}$ in. The pumping-station is placed at the top

of the orchard, all the spray being drived downward, thus reducing the required pressure to a minimum. A pressure of from 250 lb. to 300 lb. was shown on the gauge at the pump when spraying was being done, and was well maintained at the nozzles, the spray leaving them at about the same force as with an ordinary spraying outfit showing a pressure at the pump of 250–300 lb. It appeared as though very little, if any, pressure was lost, and the spraying was being done at almost 1,000 ft. from the plant. In the pumping-station two spray-tanks, each holding 800 gallons, are placed one above the other. From the lower tank the spray is driven into the mains and laterals. Each tank is provided with a good agitator. As the spray from the lower tank is being used, another mixture is prepared in the top tank, and by the manipulation of a valve is run into the lower tank when required. A rotary pump, also driven from the plant, pumps water from a well into a water-tank, from which the top spray-tank is filled as required. Double nozzles were being used. In this system the main from the pumping-station runs east and west, and the laterals north and south for the top half of the orchard, where another main runs north and south with laterals east and west. The couplings on the hose and taps, and the attachment to the tree, are similar in method to those in Mr. Brash's orchard. The 100 ft. of $\frac{3}{8}$ in. hose used did not appear excessively heavy for the operator.

Many local orchardists, realizing the importance of spraying at the proper time, irrespective of the state of the soil, are making inquiries regarding the piping of orchards, and there is no doubt that should the few plants installed this season prove a success there will be much extension in the future. I see no reason why the piping of orchards for spraying purposes should not be successful, and I would strongly advise orchardists to fully consider the question before investing in a new mobile spraying outfit.

Actinomycosis.—The number of cattle condemned for this disease throughout the Dominion in 1924–25 was 851, the condemnations being distributed as follows: Otago-Southland, 79; Canterbury-West Coast, 105; Wellington, 287; Auckland, 380. The Live-stock Division reports that actinomycosis in its earlier stages is amenable to potassium-iodide treatment, and a supply of this drug put up in tabloid form in a suitable strength was obtained during the year, and is available for sale at cost price. In lieu of condemnation, it has been advised that suitable cases be put under this treatment, and numerous recoveries have resulted.

Silage and the Quality of Milk.—Some farmers hold that silage will taint the milk of cows to which it is fed. This opinion has not been confirmed by official feeding trials with silage at Wye (England). "On no occasion," says a report in the *Journal of the Ministry of Agriculture*, "has any bad flavour been noticed, and during the time the 1922–23 trial was being carried out the College herd was included in the Kent clean-milk competition, in which it was placed second. While the competition was in progress the milk was examined periodically by a dairy expert." The fat content was taken regularly during the trials, and the records did not indicate that the change from roots to silage, or *vice versa*, had any definite effect upon the quality of the milk.

CONCRETE-WORK ON THE FARM.

(Concluded.)

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IN the *Journal* for February last the writer dealt with (1) materials used in concrete construction and their mixing, and (2) the making of posts. It was hoped to convey to those readers not already familiar with the simpler uses of concrete some knowledge of the technique of the work. It must be borne in mind that the designs of concrete structures are many, and that each is usually fitted for some special case. If these articles serve to assist the beginner in the successful performance of some of the easier tasks it is fairly certain that his interest and self-confidence will be sufficiently stimulated to cause him to carry out a greater variety of work. The laying of paths and floors for farmyards and buildings, and the making of troughs, will be dealt with in the present article.

3. CONSTRUCTION OF PATHS.

In laying a concrete path the first essential is to define what kind of traffic will be carried, so that the thickness and proportions of the materials may be arranged accordingly. A description of the laying of a path for ordinary foot traffic, and modifications required to suit other forms of traffic, will be given here.

The levels of the extreme ends of the path should be decided on, and then, if an evenly graded or level stretch of concrete is desired, boning-rods should be used as shown in Fig. 17. Three boning-rods of exactly the same length are necessary, and are used as follows: At each end of the position intended for the path, and on one edge, a peg (referred to as a "levelling-peg") about 1 in. by 1 in. or 1 in. by 2 in., and 6 in. long, is driven into the ground until its top is at the level desired for the bottom edge of the form which is to be used (the term "form" is used here instead of "mould"). Close against each of these pegs another light peg is driven. It must be placed so as to allow the boning-rod which is tied to it to rest on top of the levelling-peg (see Fig. 17). Having tied the two end boning-rods in position, a line should be stretched between them. This will assist in the alignment of intermediate levelling-pegs.

One operator (marked "A" in Fig. 17) now takes a supply of levelling-pegs and the third boning-rod. At intervals of 6 ft. to 8 ft. along the line he drives in his levelling-pegs until they are nearly at the desired level. The boning-rod is then held on top of each peg, or beside it if it is still much too high, and a second operator (marked "B" in Fig. 17) sights along the tops of the rods, indicating the level of the peg which is being placed in position. Levelling-pegs may be placed along the opposite edge of the position of the path in the same manner: or by means of a straight-edge and level the second form can be put into position after the first is secured.

If the ground on which the path is to be laid has been well consolidated by traffic and does not consist of clay an ordinary footpath can be laid directly on top of it, and 3 in. thickness of concrete will be ample,

with a slightly greater thickness at the edges of the path. Clay contracts and expands considerably, and if the ground is of this formation, or has not been well consolidated previously, a layer of porous material such as rough shingle, about 3 in. to 4 in. thick, should be laid down and well rammed. This is particularly necessary where the soil is likely to be damp and subject to severe frosts.

The levelling-pegs having been placed in position, the next operation will be to excavate to the level of the tops of the pegs, or to 3 in. or 4 in. below their tops if a foundation layer of shingle is being used. The ground or foundation layer, as the case may be, is then well rammed, and the forms placed in position and held firmly by retaining-stakes as shown in Fig. 18.

The depth of the forms should be equal to the thickness of concrete used, and for this class of work insignis pine (*Pinus radiata*), 1½ in. thick, is a cheap and suitable timber. If forms of a thickness less than 1½ in. are used it is very difficult to get a perfectly straight edge, and anything but a straight edge is objectionable to one who likes neat work. (If a curved edge is desired 1 in. or ¾ in. timber may be used, with saw-cuts at close intervals on the concave side of the form and passing almost through it, which permits of easy bending of the timber. For such work as this a more stringy timber, such as V.D.L. (stringy-bark), should be used, care being taken to put the retaining-stakes fairly close together.)

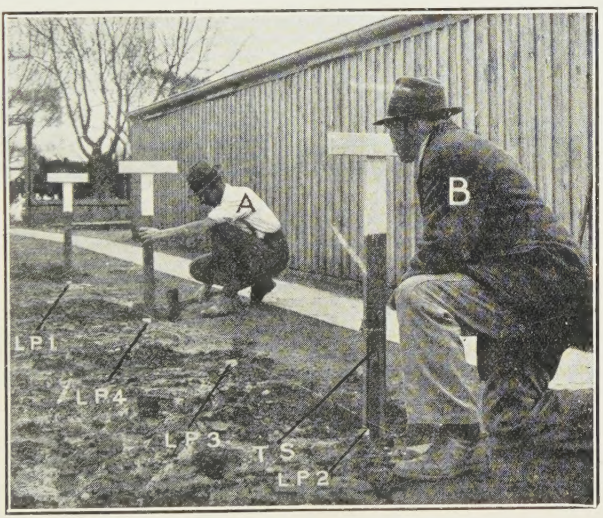

FIG. 17. SHOWING USE OF BONING-RODS IN CONSTRUCTION OF CONCRETE PATH.

The rods are here shown in use over a comparatively short distance. It is not desirable or necessary to use such rods for grading lengths of less than 20 ft., as a straight-edge or line would serve quite well for such short distances. For purposes of illustrating this work it was necessary to keep the rods close together. LP1 and LP2 are the end levelling-pegs on which the end boning-rods are resting. LP3 is a levelling-peg already in position, and LP4 is being adjusted. TS is a light stake placed in the ground temporarily for the purpose of holding the boning-rod, which is tied to it, in position. A line stretched between the end pegs assists in correct alignment of the intermediate levelling-pegs.

[*Photo by F. E. Ward.*

The next operation will be to make provision for expansion-joints. These should be put in not more than 6 ft. apart, and the work may be done by one of two convenient methods. One method is to lay the path in alternate sections, the intervening spaces being filled in after removal of the cross-forms (one of which is represented by a narrow strip in Fig. 19), which may be of the same dimensions as the side forms. When these are removed, laths, $\frac{1}{8}$ in. to $\frac{1}{4}$ in. thick, may be put along the exposed edge, or thick tarred paper used, and the blank sections between those already laid filled in. The second method, and one involving less trouble, is to put the thin laths in position, holding them at the

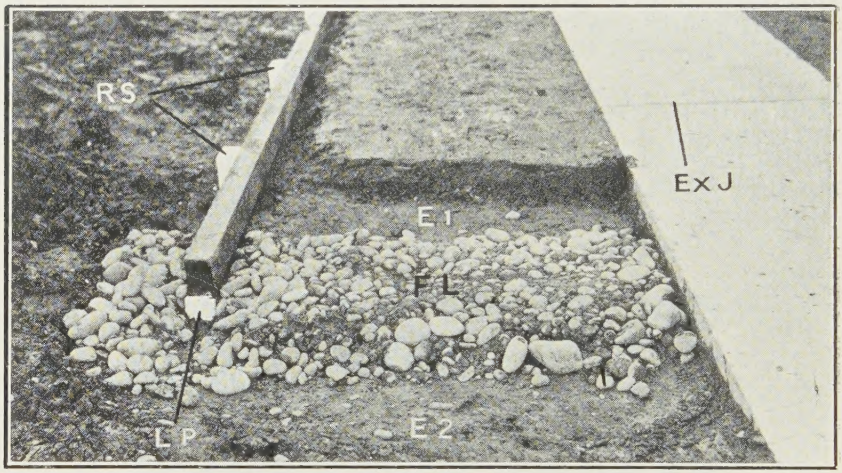

FIG. 18. SHOWING PATH IN COURSE OF PREPARATION.

One side is bounded by a form which rests on levelling-pegs, one of which is seen at LP. The other side is bounded by a strip of concrete already laid. This may be regarded as the other side form, its surface being level with top of form on left. RS are 3 in. × 1½ in. retaining-stakes. EI is a portion excavated to a depth of 3 in., as would be the case if no foundation layer was being used. E2 represents an excavation of 6 in. in depth, with FL a foundation layer of well-rammed shingle on portion of excavated area. ExJ shows an expansion-joint in the concrete path already laid.

[*Photo by F. E. Ward.*

ends by a nail—not driven right home—through the side forms. Light temporary pegs (T.P. in Fig. 19) can be put in to assist in taking the pressure of the concrete from the side against the section being laid; or, if when a section is nearly completed a quantity of concrete is put in the next section against the lath, no danger of its displacement will be experienced. Expansion-joints formed in the manner described are very necessary, for, unless concrete is well reinforced, visible cracks are inevitable, and the use of such joints breaks the work up into sections, each of which can expand or contract without cracking. Such sections should not be more than 6 ft. along any side.

The laying of the concrete should be accompanied by good ramming, and if a very smooth surface is not desired a satisfactory finish will be obtained by levelling across the path by means of a straight-edge which rests on the side forms (see Fig. 19). A side-to-side motion, accompanied by a forward one, of such a straight-edge will leave a fairly good surface when the customary aggregate of shingle is used. Should a finely finished surface be desired, the concrete laid down first should come only to within about $\frac{1}{4}$ in. of the tops of the forms and should not be smoothed off. While the concrete is still green (within twenty-four hours of laying) a finishing-coat of one part cement to two

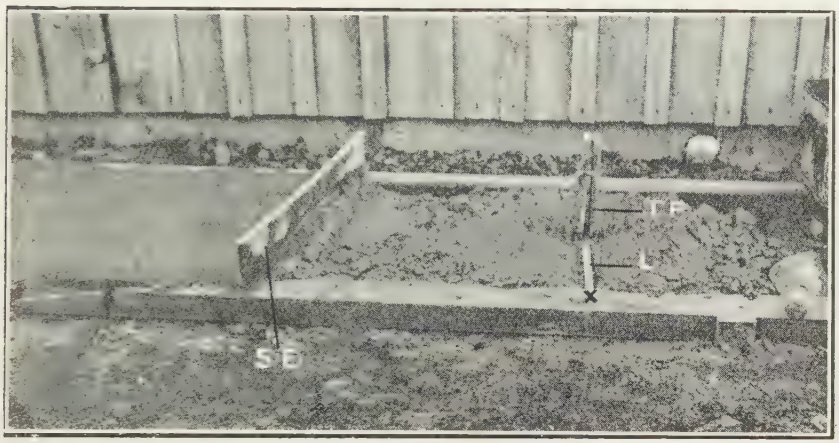

FIG. 19. SHOWING, ON A SMALL SCALE, METHOD OF FILLING IN OR LEVELLING OFF OF PATH OR FLOOR.

If the method of putting down the work in alternate sections is adopted a strong cross-form $1\frac{1}{2}$ in. thick would take the place of the lath L, and the section on the right of the lath would then be filled in after the removal of the cross-form. By placing two or three light pegs similar to TP against the lath which is secured by a skew nail at X, and filling in carefully and evenly on both sides of the lath, all sections can be put in as the work proceeds. The temporary pegs TP are removed as soon as the concrete is evenly packed on both sides of the lath. The straight-edge SE has been used for levelling off between the forms after the concrete has been well rammed and left slightly higher than the tops of the forms.

[*Photo by F. E. Ward.*

of sand should be applied, and be finished off with a wooden float Excessive floating or trowelling, especially with a steel trowel, must be avoided, or hair-cracks will result. Pure cement is also likely to produce crazing or hair-cracks. All edges (outside and along expansion-joints) should be chamfered as soon as the finishing-coat will retain an impression.

The work must be kept damp for as long as possible, and should not be used until well hardened. In the case of footpaths two or three weeks should suffice, providing the edges are still protected; but in the case of paths for heavier traffic and floors for cowyards from one to two months should be allowed. Stable-floors require an even longer period if the risk of breaking the floor is to be avoided.

4. FLOORS.

The foregoing matter will serve as a guide to method in laying floors of farmyards and farm buildings, and the following table is given as a guide to strength of mixtures, thickness of work, &c. :—

Class of Work.	Ratio of Cement to Good Shingle Aggregate.	Minimum Thickness of Concrete.
Footpath	1 : 6	3 in.
Track for heavy-wheeled traffic ..	1 : 5	6 in.
Cowyard or byre	1 : 6	4 in.
Stable-floor	1 : 5	4 in., thickening to 6 in. at position of hind feet.
Floor of pigsties and yard ..	1 : 6	3 in.

Floors of cow-sheds and stables should not be finished too smoothly, owing to the danger of injury to animals through slipping. Fluting of the surface in places where there is a liability of slipping is easily done by forming a series of impressions with the edge of a piece of scantling or with a frame such as that shown in Fig. 20.

Where a fairly large expanse of work is desired, as in the case of a cowyard or cow-byre floors, the best method is to put the work down in strips 6 ft. wide with expansion-joints every 6 ft. (the method on a small scale may be seen in Fig. 18). This will divide the area into sections each 6 ft. square. All levelling-pegs should be placed in position along lines where the edges of strips will fall. The foundation layer of shingle can then be put in each strip while the concrete in the

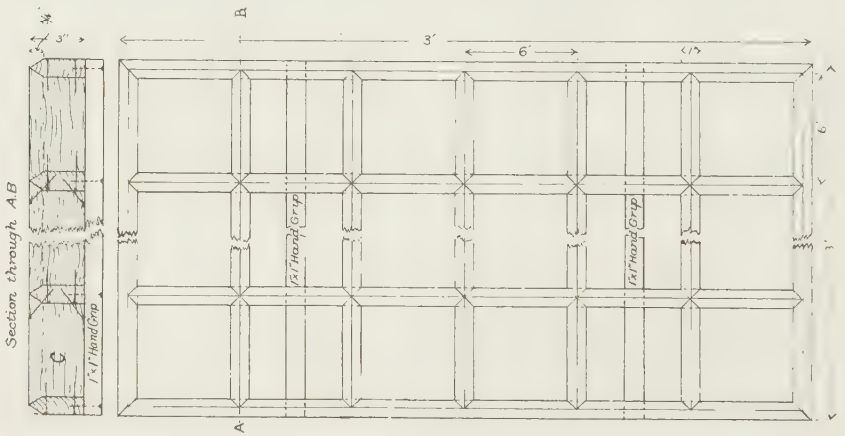

FIG. 20. IMPRESSION-FRAME FOR FLUTING COW-SHED OR STABLE-FLOORS.

Frame is made of 3 in. × 1 in. battens, and is 3 ft. square. The continuous battens provide long parallel strips, which are broken up into squares by the short cross-battens. The latter, after being bevelled, are cut to fit as shown in a typical case at C in the sectional elevation. Frame is shown inverted in plan. It should be used as soon as the concrete will keep an impression—usually half to one hour after laying in fair drying weather.

preceding one is setting. Each strip of concrete already laid will then serve as a form for one side of the succeeding strip. A thin lath or thick tarred paper against the edge of the concrete will provide the necessary expansion-joint. A fall of 1 in. in 5 ft. or 6 ft. must be allowed for.

5. TROUGHS.

PIG-FEEDING TROUGHS.

Durable pig-feeding troughs are easily and quickly made in concrete. Figs. 21 and 22 show suitable moulds for their construction. The sides of the mould (Fig. 21) must taper to allow of its easy removal.

The aggregate for such troughs should contain no stones larger than about $\frac{1}{2}$ in. diameter. A good proportion of sand is necessary. The ratio of cement to aggregate should not be greater than 1 to 4. Reinforcing is essential, and should consist of a strong wire (No. 3-6) running completely round the upper edge of the trough, with chain netting or expanded metal throughout the whole of the sides, bottom, and ends. (Cyclone chain netting of No. 8 galvanized wire and 4 in. mesh now costs 1s. 11d. per square yard. Expanded metal No. 9, 3 in. across the short way of the diamond mesh, costs 2s. 6d. per square yard. The dimensions of the strands are $\frac{3}{16}$ in. by $\frac{1}{8}$ in. Being more rigid, the expanded metal will be found more convenient to use.)

WATER-TROUGHS.

Failure to secure a watertight trough is often experienced merely because some of the simpler rules for the making of concrete are not observed. A good foundation is necessary, and to obtain this the ground on which the trough is to stand should be excavated to a depth of from 4 in. to 6 in. below the level intended for the lower side of the trough-bottom. The excavation should be at least 1 ft. wider all round than the trough, and when well rammed should be filled to the desired level with a layer of shingle also rammed until as compact as possible. The outer form (see Fig. 23) is next placed in position and well stayed to prevent bulging of the sides when the concrete is being rammed in. Reinforcing-material, the inner form, and sufficient aggregate and cement to complete the trough should now be got in readiness. The inner form, as shown in Fig. 23, should reach to within about 4 in. of the bottom edge of the outer form, and is suspended by means of the pieces of scantling across the top. These serve also as distance-pieces, and when secured to both outer and inner forms prevent bulging of the top edges. In addition to these, distance-pieces are placed between the sides of the inner form near the bottom. The sides and ends of the inner form must taper, being closer at their bottom edges than at the top. If this is not done, great difficulty in their removal and probable damage to the "green" concrete will result. Having prepared the inner form and fitted it temporarily to make sure that everything is in order, it should be removed, and the work proceeded with as follows:—

First lay about 2 in. of concrete over the whole of the foundation within the outer form. On this place chain netting or expanded metal with sufficient turned up at the sides and ends to come to within 1 in.

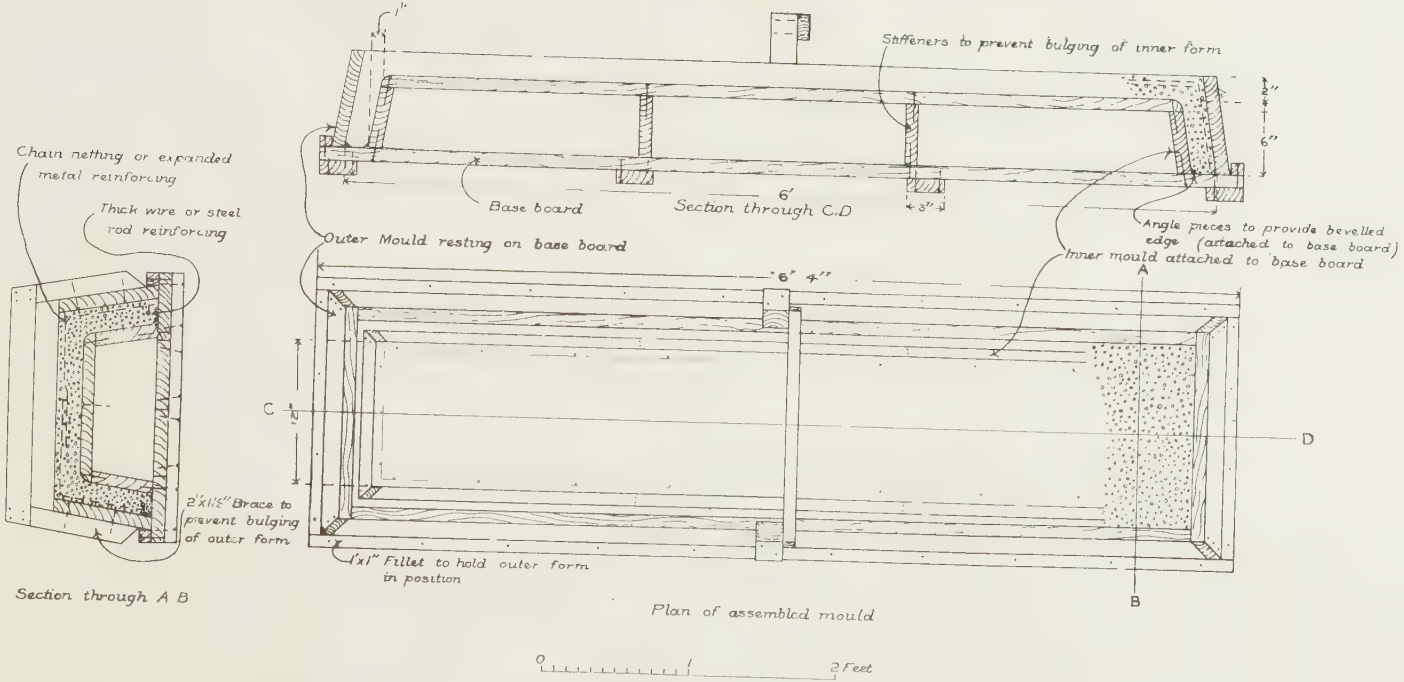

FIG. 21. DRAWINGS OF MOULD FOR PIG-FEEDING TROUGH.

Suitable for making trough 5 ft. 6 in. × 12 in. on bottom of inside, and 5 ft. 8 in. × 14 in. at top. Thickness of sides and bottom, 2 in. Outer mould rests on baseboard, and is held in position by 1 in. × 1 in. fillets running round edges. All timber 1 in. thick unless otherwise specified. In section AB reinforcing is shown to be in two pieces which overlap. Filling of sides is carried out with reinforcing in position. When filling process nearly complete (to within about 1 in. of top) reinforcing of each side is bent over and overlapped, then tied with lacing-wire.

[*Modified from "Everyday Uses of Portland Cement."*]

of the top of the form, and in such a way as to ensure its being not closer than 1 in. to either form. The corners should be overlapped and fastened with lacing-wire. About another 1 in. of concrete is then placed on top of that already on the bottom, and the inner form placed in position and securely fastened to the outer form by means of cross-pieces. It should be noted here that the sides and ends of the inner form should not be too securely fastened together. The best method will be to use corner-pieces, about 2 in. by 2 in. (see Fig. 24), in which the nails are not driven right home. On withdrawal of the nails the sides and ends will be easily removed.

The filling-in of the sides may now be proceeded with. The concrete should be slightly wetter than for most purposes, and puddled rather than rammed, as a little at a time is put in. It must not be so wet as to cause water to run out of it, however. It will be found that the pressure of the material being put in at the sides causes the bottom to rise slightly. It is an advantage, therefore, to leave $\frac{1}{2}$ in. or so of the bottom to be filled in when the sides are completed, when it can be levelled without danger of being disturbed again. Reinforcing-rods of $\frac{1}{4}$ in. round iron, running completely round the walls of the trough at intervals of 6 in., will give considerable additional strength, but, whether these are used or not, a rod should run completely round the top, about 1 in. below the surface. As soon as the concrete is sufficiently firm (about one hour after placing in position) the edges should be chamfered.

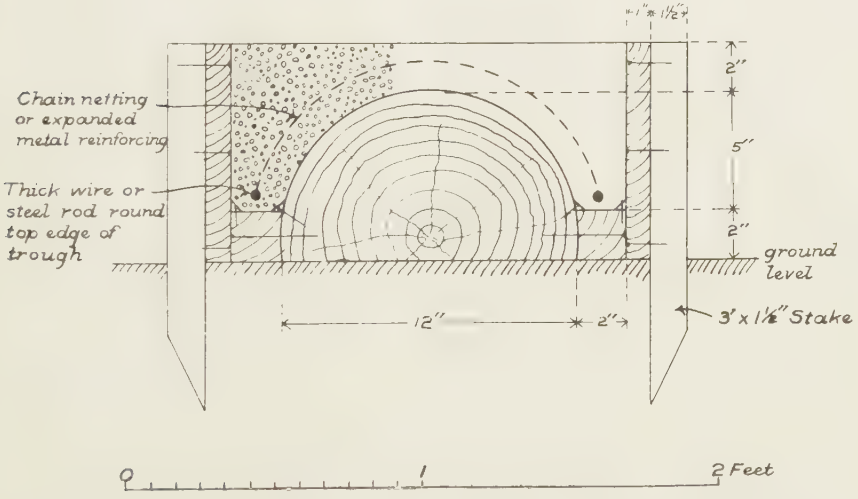

FIG. 22. SHOWING METHOD OF USING A LOG IN CONSTRUCTION OF TROUGH.

Length of trough should not be greater than 6 ft. Any excrescences must be cleaned off log, and ends so cut that length at bottom of trough (top of log) is at least 1 in. less than length at rim. If these precautions are not observed, difficulty in removal of trough will be experienced. Trough may be removed in about ten days if great care is exercised.

[*After "Everyday Uses of Portland Cement."*]

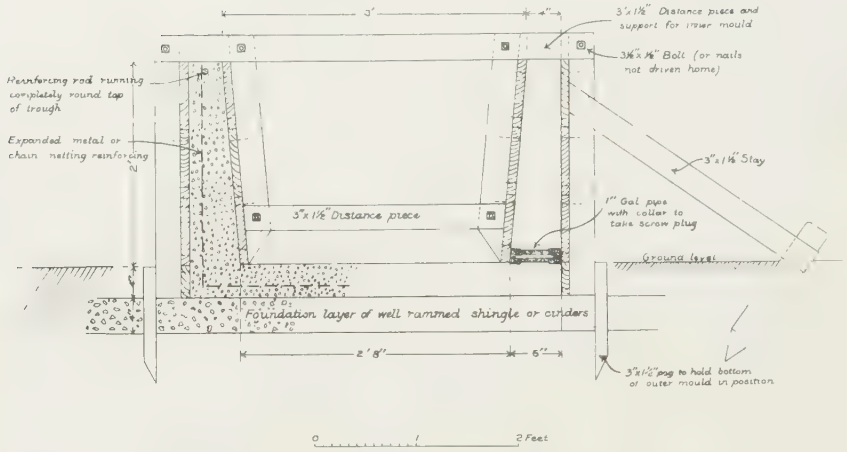
3'
4"
3"x1½" Distance piece and support for inner mould
3/16"x½" Bolt (or nails not driven home)
Reinforcing rod running completely round top of trough
Expanded metal or chain netting reinforcing
3"x1½" Stay
3"x1½" Distance piece
1" Gal pipe with collar to take screw plug
Ground level
Foundation layer of well rammed shingle or cinders
2'8"
6"
3"x1½" peg to hold bottom of outer mould in position
0
1
2 Feet

FIG. 23. CROSS-SECTION OF MOULD FOR WATER-TROUGH SUITABLE FOR CATTLE OR HORSES.

Suggested dimensions on inside of top, 8 ft. × 3 ft.; depth inside, 2 ft. Upright supports of mouldboards should be not more than 3 ft. apart. All scantling is 3 in. × 1½ in., and board 1 in. thick, except where otherwise specified.

After one or two days the inner form may be removed and the surface smoothed over with a mixture of one part of cement to two of sand. At this time the work is still "green," and a complete union will take place. If the sand for such work is passed through a fine sieve so that very small stones are removed a very thin coat can be applied with ease. The amateur will be wise to use only a wooden float for smoothing off, and to avoid its use in excess. The removal of the outer form may be carried out after two or three days, but great care must be exercised, and the work well protected and kept damp.

Provision for draining of the trough is easily made by placing a piece of pipe, with a coupling attached to take a plug or tap, at the level of the trough-floor. An alternative is to use a smooth, tapering, wooden plug, which may be driven out when the concrete is hardened.

Unless the forms for such work as this are likely to be used a number of times, a cheap timber such as insignis pine (undressed) will be quite suitable.

REPAIRING A CRACKED TROUGH.

To get a complete and satisfactory bond between old and seasoned concrete and new work is extremely difficult, and if through bad workmanship or accident a trough is found to leak the most satisfactory method of repairing the damage will be to build a new trough within the old one. In this case all that is required is an inner form, the old trough being used as the outer form. A new shell about 2 in. thick and reinforced as just described will be quite sufficient. The inside of the old work must be thoroughly cleaned and its surface roughened with a cold chisel.

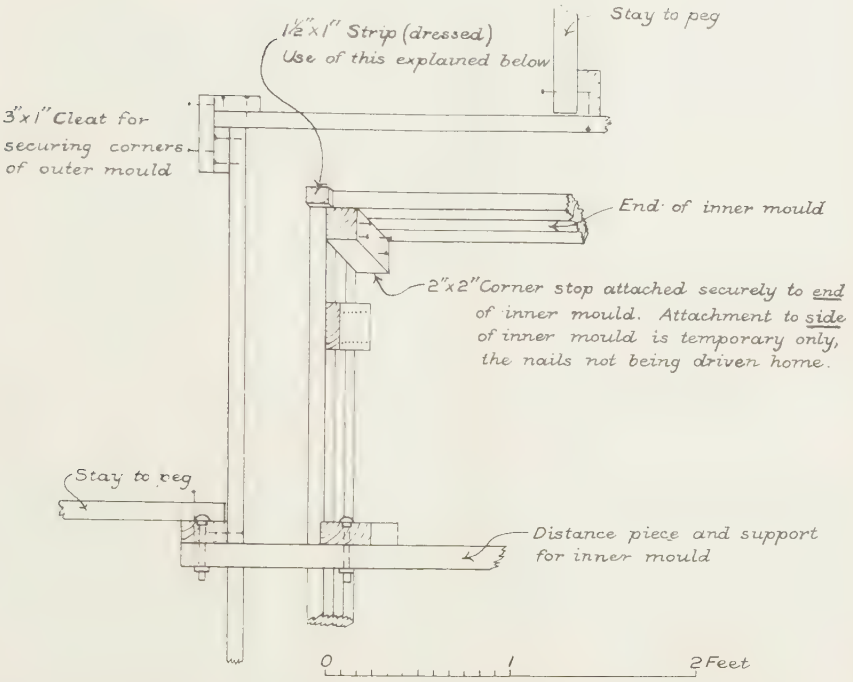

FIG. 24. DETAILS OF CORNER OF ASSEMBLED MOULD OF WATER-TROUGH.

Chief point of interest here shown is method of making provision for easy removal of inner mould. End portion is secured to side by means of nails (not driven right home) through 2 in. × 2 in. corner strip. This permits of their easy withdrawal and removal of end of inner mould. It will be noticed that end is $\frac{1}{2}$ in. short of meeting side; consequently a space of $1\frac{1}{2}$ in. × 1 in. is left. A carefully dressed strip, which stands sufficiently high above top of mould to allow a grip of hand being taken, is inserted in the space. It may be held in position at top by a small nail so placed as to be easily withdrawn when mould is filled. Its bottom end will be held in position by concrete as soon as filling commences. About two hours after concrete has been filled in, corner strips may be removed carefully. Result is a space between ends of sides and ends of mould and corner. Removal of inner mould about twenty-four hours later is then a simple matter, and no damage to the work need be caused.

Too much stress cannot be laid upon the necessity for keeping newly done concrete-work from exposure to frost and rapid drying. Covering with old bags, sand, or straw, well wetted in dry weather, must not be neglected.

The writer desires to express thanks for much advice and instruction in concrete-work received from Mr. R. E. Alexander, Director, and Mr. McIntosh, mechanic, of Canterbury Agricultural College. To Mr. Knight, Superintendent, and Mr Jordan, concrete expert, at Paparua Prison Farm, thanks are also due for a design of a post-mould. Mr. F. E. Ward's suggestion for the compilation of some practical directions in the simpler uses of concrete, and his valuable assistance with the camera and in affording facilities for carrying out much of the work connected with the preparation of these articles, are also much appreciated. A publication kindly forwarded by the Milburn Lime and Cement Company has proved of much use for reference. Photos of posts reproduced in the first article were taken at Lincoln College by permission of the Director.

TESTING OF NEW-ZEALAND-GROWN WHEATS.

RESULTS FOR THE CURRENT YEAR.

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I. MILLING-QUALITIES.

WORK on the quality of locally grown wheats has this year been carried a stage further. A number of varieties from different localities has again been tested on the Department's experimental flour-mill, and chemical and baking tests have been carried out with the flours obtained from the different wheats. Only the milling-qualities of the different samples will be discussed in this article*; results of chemical and baking tests will be dealt with as opportunity permits.

Of the total number of wheats received, eight samples were from the 1924 harvest; seven of these were grown in Lake County. The eighth was an unnamed variety, probably a Durum or macaroni wheat. The remaining samples were from the 1925 harvest, and came mostly from Canterbury; eighteen of these were grown at the Ashburton Experimental Farm, one at Cust (Rangiora County), one at Lincoln (Springs County), and the last at Hinds (Ashburton County). This sample was another unnamed variety, probably also a Durum. Three samples were received from the Gore Experimental Area (Southland).

It will be seen that most of the samples were from the Ashburton Experimental Farm. Comparatively few of the more common varieties were received, the samples being for the most part lesser-known wheats. At the same time, many of these were of considerable interest, especially the strong wheats Marquis, Red Fife, and Yeoman..

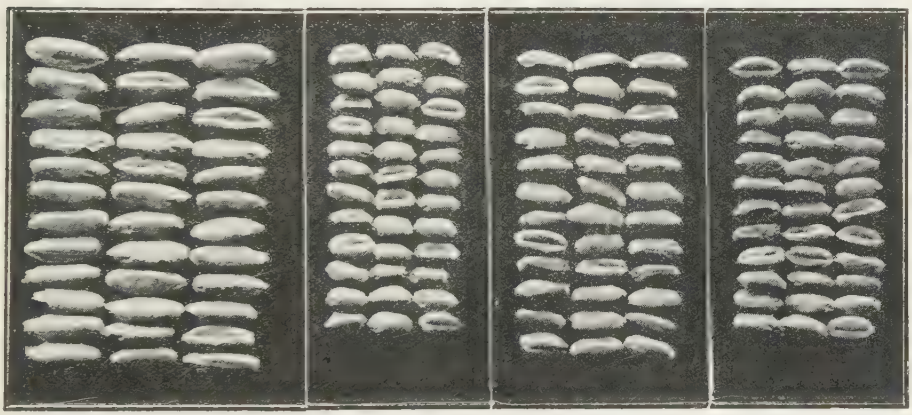
DURUM OR MACARONI WHEATS.

This year's samples include two Durum wheats, a variety more or less unknown in New Zealand, but grown extensively in certain countries, especially in Russia and Italy, and to a lesser extent in the United States and in Canada. These wheats produce flour of a kind particularly suitable for the manufacture of macaroni, &c., hence their more common name of "macaroni" wheats. Durum wheats are used for breadmaking purposes more extensively than is commonly supposed. In parts of Europe they are the most popular for this purpose, and are said to produce a loaf of excellent flavour. They are fairly easily damaged by frost, but possess great powers of resisting drought, and are highly resistant to rust and smut fungi. The chief drawback to Durums is the extremely flinty nature of their grain, and the careful conditioning which they consequently require to ensure any measure of success in milling. The flour made from them is much creamier in colour than the average. Its sugar content is generally high, and it is as a result sweeter; it is thus useful for blending with flours deficient in this respect. Durums produce as a rule only from 66 to 69 per cent. of flour, and therefore give a rather poor yield of flour.

* The complete series will comprise: (1) Milling Tests; (2) Chemical Analyses; (3) Baking Tests; (4) The Quality of Flour—(*a*) Hydration Capacity of Gluten, (*b*) Active Acidity (*p*H) of Flour.

It is uncertain if there is any demand in the Dominion for Durum wheats for the purposes of blending with the commoner varieties in flour-milling, but for the manufacture of macaroni and allied products, such as spaghetti, these wheats are unrivalled. In fact, macaroni of the best quality can be made only from Durum wheats, and it is for this purpose that the latter are grown so extensively in Italy and southern Europe. Imported macaroni of the best quality is in New Zealand an expensive article of diet (now 1s. 9d. per lb.). Since the best macaroni can be made only from Durum or macaroni wheat, it seems that the growing of this wheat locally should be of considerable importance in the manufacture of macaroni in New Zealand—that is, if it hopes to compete in quality with the article imported from abroad.

The illustration shows the remarkable size of Durum wheat when compared with some more common varieties. On the left is the sample of Durum (T 78); its length and peculiarly narrow shape



SHOWING ACTUAL SIZE OF CERTAIN OF THE TESTED WHEATS (THIRTY-SIX GRAINS IN EACH SAMPLE).

From left to right: (1.) Durum; yield of flour, 69·1 per cent. (2.) Velvet Ngapara; yield, 76·2 per cent. (3.) Solid-straw Tuscan; yield, 69·3 per cent. (4.) Hybrid W; yield, 77·3 per cent.

[*Photo by F. T. Leighton.*

are obvious, especially when compared with the sample of Velvet Ngapara (S 773) alongside it. The third wheat is Solid-straw Tuscan (T 52), and represents the average size of wheats grown in New Zealand. Hybrid W (T 101), a small wheat, is interesting because of the very high yield of flour (77·3 per cent.) obtained from this sample.

CONDITION OF SAMPLES.

This year's samples showed in some cases considerable damage from weathering. The wheats grown in Lake County were generally well filled, and never showed more than traces of damage; in texture they were fairly hard, and generally were good-looking samples. Those wheats received from Gore were also free from weathering to any marked extent. The Ashburton wheats appeared to have suffered

the most, and the samples S 765, 772, 774, 775, and 778 showed signs of being considerably affected. The uniformity and filling of some of these particular samples were consequently below the average. It should be noted, however, that others from Ashburton showed not the least sign of damage, and were in every way good-looking samples of grain.

WEIGHT PER BUSHEL.

The weight per bushel of wheat was again calculated, but no connection was found between this weight and the milling-qualities of the grain.

MILLING OF SAMPLES.

Except for the Durum wheats, which were rather difficult to mill, all the samples tested this year milled with average ease; and it is possible that with more experience of the treatment necessary for complete success Durums would also give no trouble in the mill. The actual milling of the samples was carried out with consistent results, and Table 1 shows the degree of agreement between those samples milled in duplicate and on different days, when the conditions regarding humidity, &c., differed to some extent.

Table 1.

Laboratory No.	Variety.	Bran.	Pollard.	Flour.
		Per Cent.	Per Cent.	Per Cent.
S 771	Velvet	11·5	14·2	74·3
		12·0	14·0	74·0
S 774	Essex Conqueror ..	11·5	13·4	75·1
		11·0	14·1	74·9
S 775	Yeoman	10·8	15·0	74·2
		10·4	15·5	74·1
T 51	Major	15·5	13·7	70·8
		14·2	15·3	70·5

The results of the milling-tests are given in Table 2. There was not a sufficient number of the better-known varieties received to warrant them being arranged as in previous years (see *Journal*, June 1924, p. 401, and July, 1923, p. 1), and the varieties are consequently not grouped together as has hitherto been the case. Varieties as a whole are divided into two parts, the first consisting of those obtained from the 1924 harvest, the second those from the 1925 harvest. They are then arranged in each part in order of the percentage of flour obtained from each sample on milling.

NOTES ON THE TABULATED RESULTS OF MILLING TESTS.

The bulk of the 1924 wheats came from the Lake district, and maintained a good average. Samples S 714, 710, and 712 produced very good, and the others good, percentages of flour. Some of these wheats were hard in texture, but all were easy to mill. A Durum wheat is included in this series, but there is a possibility that this sample was overmilled, and the percentage of flour may be misleading. In any case, the amount of flour obtained appears to be high for a wheat of this variety.

Table 2.—Milling Tests.

Laboratory No.	Variety.	Where grown.		Date of Milling.	Calculated Weight per Bushel.	Milling Test.			Remarks on Yield of Flour.
		Locality.	County.			Bran.	Pollard.	Flour.	
				1924 Wheats.	lb.	Per Cent.	Per Cent.	Per Cent.	
S 714..	Velvet	Ardgour ..	Vincent ..	30/3/25	63·8	13·9	11·7	74·4	Very good.
S 710..	Tuscan	Arrowtown ..	Lake ..	20/3/25	66·0	10·4	15·9	73·7	,,
S 712..	,, ...	Gibbston ..	,, ..	30/3/25	67·8	12·2	14·1	73·7	,,
S 709..	,, ...	Arrowtown ..	,, ..	25/3/25	66·2	15·1	12·2	72·7	Good.
S 708..	,, ...	Gibbston ..	,, ..	25/3/25	66·4	12·0	15·4	72·6	,,
S 713..	Hunter's	Tarras ..	Vincent ..	1/4/25	62·6	15·7	12·0	72·3	,,
S 711..	Tuscan	Arrowtown ..	Lake ..	26/3/25	66·4	18·3	10·5	71·2	Medium.
S 392..	Durum (?)	..	..	1/4/25	66·8	8·3	16·3	75·4	Very good.
				1925 Wheats.					
T 101..	Hybrid W	Horrelville ..	Eyre ..	16/6/25	65·8	11·0	11·7	77·3	Excellent.
S 776..	Zealand	Ashburton ..	Ashburton ..	8/5/25	66·4	11·5	11·5	77·0	,,
S 773..	Velvet Ngapara ..	,, ..	,, ..	6/5/25	65·4	10·9	12·9	76·2	,,
S 774..	Essex Conqueror ..	,, ..	,, ..	6/5/25	63·0	11·5	13·4	75·1	Very good.
S 771..	Velvet	,, ..	,, ..	30/4/25	67·2	11·5	14·2	74·3	,,
S 775..	Yeoman	,, ..	,, ..	7/5/25	63·0	10·8	15·0	74·2	,,
S 770..	White Tuscan ..	,, ..	,, ..	29/4/25	65·0	12·3	14·1	73·6	,,
S 772..	Snowdrop	,, ..	,, ..	5/5/25	61·6	13·5	13·0	73·5	,,
S 778..	Hybrid W	,, ..	,, ..	25/5/25	64·7	12·0	14·6	73·4	,,
T 75..	College Hunter's ..	,, ..	,, ..	22/6/25	67·2	14·8	11·8	73·4	,,
S 779..	Scandinavian ..	,, ..	,, ..	26/5/25	59·4	12·4	14·3	73·3	Good
S 766..	Queen Fan	,, ..	,, ..	23/4/25	66·4	10·5	17·2	72·3	,,
T 76..	College Velvet ..	,, ..	,, ..	2/6/25	67·6	13·8	13·9	72·3	,,
S 768..	Major	,, ..	,, ..	28/4/25	65·4	12·1	15·9	72·0	,,
S 777..	Red Fife	,, ..	,, ..	22/5/25	67·6	14·6	13·4	72·0	,,
S 765..	Jumbuck	,, ..	,, ..	23/4/25	66·4	10·3	18·0	71·7	,,
S 767..	Queen Fair	,, ..	,, ..	24/4/25	67·2	15·5	12·8	71·7	,,
T 77..	Solid-straw Tuscan ..	,, ..	,, ..	4/6/25	68·0	12·0	16·3	71·7	,,
T 37..	Velvet	Lincoln ..	Springs ..	27/5/25	68·0	14·3	14·6	71·1	Medium.
T 51..	Major	Gore ..	Southland ..	28/5/25	64·7	15·5	13·7	70·8	,,
T 50..	Marquis	,, ..	,, ..	28/5/25	66·4	15·0	14·4	70·6	,,
S 769..	,, ...	Ashburton ..	Ashburton ..	29/4/25	66·8	14·0	16·0	70·0	Poor.
T 52..	Solid-straw Tuscan ..	Gore ..	Southland ..	29/5/25	64·4	16·2	14·5	69·3	,,
T 78..	Durum (?)	Hinds ..	Ashburton ..	4/6/25	65·8	8·9	22·0	69·1	,,

Of the wheats from the 1925 harvest, the best milling-wheat was a sample of Hybrid W (T 101). This sample gave the excellent amount of 77·3 per cent. flour; last year another sample of the same variety gave the very good yield of 75·6 per cent. The sample milled this year was a rather small grain (average length 5–6 mm.), but was very well filled; in texture it was soft and starchy. This variety is interesting as being a possible rival to Victor. In milling-qualities Victor and Hybrid W are very much alike, both producing on an average very good percentages of flour. This year Hybrid W gave the highest percentage of flour of any wheat received; last year and the year before Victor topped the list.

Zealand (S 776), another soft wheat, produced an excellent amount of flour (77 per cent.). This was a good-looking sample, of excellent uniformity and filling; it possessed the highest calculated weight per bushel of the samples tested this year. The next sample, Velvet Ngapara (S 773), gave the best yield of flour (76·2 per cent.) of the Velvets received; last year it held a similar position. This particular sample showed fair uniformity, was well filled, and possessed a hard and flinty texture. Essex Conqueror (S 774) produced a very good amount of flour (75·1 per cent), but in appearance was only fair, being small, of poor uniformity, and poorly filled; it had suffered considerably from weathering. This variety is of considerable interest, as will be seen in an article to follow on the baking-quality of these wheats. A sample of Velvet (S 771) was a hard, flinty wheat, producing a very good percentage of flour. Yeomen (S 775) was a fairly long grain (7–8 mm.), of medium appearance, poorly filled, and considerably weathered. It gave, however, a very good yield of flour. The following wheats call for no particular mention, except that they all gave very good percentages of flour: White Tuscan (S 770), Snowdrop (S 772), Hybrid W (S 778), College Hunter's (T 75), and Scandinavian (S 779).

The following wheats gave good average amounts of flour: Queen Fan (S 766), College Velvet (T 76), Major (S 768), Red Fife (S 777), Jumbuck (S 765), Queen Fair (S 767), and Solid-straw Tuscan (T 77).

A sample of Velvet (S 37) produced only a medium percentage of flour (71·1), an amount which is not up to the level of the average for Velvet. Two samples from Gore—Major (T 51) and Marquis (T 50)—gave medium percentages of flour. Three samples were poor in this respect Marquis (S 769), Solid-straw Tuscan (T 52), and Durum (T 78).

VARIETIES AND LOCALITIES.

The samples from Lake County gave a good average yield of 72·5 per cent. of flour. The average for 1922 was 72·1 per cent.; the later figure is thus in agreement with the good average to be expected from this district.

Southland County wheats averaged 70·2 per cent. flour. None of the samples differed much from this figure, which is rather on the low side. Eight samples milled from the same district in 1923 gave an average of 70·7, and here again very few samples differed from the average.

The samples from the Canterbury Province gave the very good average of 73·0 per cent. flour. Those examined last year gave an average of 72·8 per cent., and in 1923 the figure was 73·2 per cent. These percentages show a very good agreement, and as a considerable number of samples from Canterbury have now been examined a certain significance may be attached to them.

So far, with the exception of Ashburton (and the samples come mostly from the Ashburton Experimental Farm), a sufficient number of wheats has not been received from Canterbury counties to enable averages for counties to be of any value.

As data on the milling and the qualities of wheat are gradually collected it should be possible to obtain significant figures not only for provinces, but for each particular county at least, and eventually for each localized wheatgrowing area.

SUMMARY AND CONCLUSION.

A sufficient number of the better-known varieties to make any useful comparison between varieties was not received this year. Five samples of Velvet averaged 73·7 per cent. flour, and fully maintained the good average characteristic of this variety. As a whole, the miscellaneous wheats gave very good milling results, Hybrid W, Zealand, and Essex Conqueror being outstanding varieties.

Of the wheatgrowing districts, Canterbury Province more than maintained its good average (73·0 per cent.) for the percentage yield of flour. The Lake district, represented by considerably fewer samples, was practically as good in this respect (72·9 per cent.). The samples from Southland were again rather low (70·2 per cent. flour).

Again no relationship between yield of flour and calculated weight per bushel could be found.

(Series to be continued.)

CANE-WILT ATTACKING BLACKBERRY.

SEVERAL reports have been received lately from various parts of Auckland Province concerning a blight observed to be attacking blackberry. The matter has been given wide publicity by the newspaper Press in relation to the question of control of the blackberry pest. Specimens of diseased plants were forwarded by Mr. H. D. M. Haszard, of Waihi. On examination at the Biological Laboratory, these were found to be infected with cane-wilt (*Leptosphaeria Coniothyrium*), a fungus common on blackberry. The fungus sometimes kills the canes back to ground-level, but usually does little more than form small cankers on the canes and spots on the leaves.

It may be mentioned that in 1921 similar reports and specimens were received by this Department from the Auckland, Poverty Bay, and Hawke's Bay districts. An investigation in the Auckland District was made by Mr. G. H. Cunningham, the Department's Mycologist, who determined the disease as cane-wilt. A full report on the matter by Mr. Cunningham was published in the *Journal* for May, 1922, under

the title of "A Fungus Disease attacking Blackberry: Identified as Raspberry Cane-wilt." The following extracts from this article are reprinted for further information :—

On the whole, blackberries are much less severely infected than are raspberries. Panicle-infection is by far the commonest stage, cane and leaf infection as a rule being slight. On canes, infection is not followed by sudden wilting, but where it has been severe, cankers appear which so weaken the cane that it gradually dies. The first appearance of the fungus on canes is made noticeable by the presence of minute white blisters. These are formed by the epidermis being separated from the tissues below on account of the dissolution of the latter by the hyphæ of the fungus. These blisters gradually increase in size and coalesce, the epidermis finally falling away, leaving minute irregular cankers in which may be seen the fruiting bodies of the fungus.

Flower and fruit infection is the common stage on blackberry, resulting in the nearly mature fruits, their pedicels, and the main axis of the panicle being killed back to the cane. Further than this the fungus rarely penetrates. This stage becomes very conspicuous where attack has been severe, as the whole panicle, including the fruits, turns a pale-chestnut colour. Infection may occur in the fruits themselves, in which case the hyphæ ramify between and send branches into the drupelets, which are soon drained of their contents. The fungus then works down the pedicel and up into other fruits, or else by attacking the lower portion of the peduncle may cause the death of most of the fruits by cutting off the water and food supplies. The fact of this organism being the cause of the death of the panicles is often obscured by the presence of numerous saprophytic fungi which make their appearance on the dead fruits. Of these the most common is a species of *Rhizopus*, which forms a dense black mould over the whole surface of the fruit.

Leaf-infection, which is slight both on raspberries and blackberries, results in minute dead areas being formed, which fall away, leaving small perforations.

It is noticeable in the field that certain varieties of blackberry are more susceptible to attack than others. For example, one of the most common varieties in the North is a small semi-prostrate profusely fruiting one ; wherever this plant occurs in an infected area it is invariably badly attacked. A much less common variety is somewhat erect, large-leaved, vigorous-growing, and shy-fruiting ; this plant is usually free from all traces of the fungus. Infection in all degrees of severity may be seen in the field. Observations lead one to believe that this is due to the paucity or abundance of fruits, as invariably profuse-fruiting varieties are small and stunted in their growth, and suffer much more severely than the strong-growing, vigorous, shy-fruiting varieties. . . .

Regarding the use of this fungus in the control of blackberry, when it first made its appearance on blackberries it was thought by many persons that the disease would exterminate this weed. Numbers of specimens were forwarded to this Laboratory with requests for information as to what had killed them, and whether the organism could be used as a controllant. . . . Although many hundreds of infected blackberry-plants were observed on the trip referred to, not one was seen to have been killed outright. Where infection is severe practically all fruiting is prevented by the killing of the panicles, but cane-injury is so seldom seen as to render this phase of the disease entirely negligible.

From the foregoing it would appear that although *Leptosphaeria Coniothyrium* is the cause of heavy loss in certain seasons to raspberry-growers, it causes little or no real damage to blackberry-plants, though, where infection is severe, fruiting on certain varieties may be entirely prevented. The probability therefore is that if the fungus were introduced into any locality with the object of exterminating blackberry it would do little or no damage to the latter, but would spread to a host more favourable to its development, such as raspberry, should this plant be growing in the neighbourhood. Furthermore, there is always the danger of its spreading to hosts other than the two under discussion. In America it has been recorded on roses and apples, and in Europe on a large number of hosts, among which may be mentioned barberry, elderberry, and willow.

PUWERA EXPERIMENTAL AREA.

DEVELOPMENT FROM GUM-LAND HEATH TO DAIRY FARM.

T. H. PATTERSON, H.D.A., Instructor in Agriculture, Auckland.

EARLY in the present year it was decided to establish a small herd of dairy cows at Puwera. On the improved area, 66½ acres in extent, about 50 acres were in good pasture, while the remainder was ploughed and lying fallow, awaiting seeding to fodder crops on one portion and to grass on the rest. The established rye-grass-clover pasture is considered first class, and as it had carried an average of one cattle-beast to 2 acres—and the stock had done well—it was thought that dairying could be attempted with good prospects of success. The object is to ascertain what amount of butterfat per acre can be produced on the area.

A dairy shed has recently been erected, consisting of two milking-bails and a separator-room. Hand milking is now being carried on, with a herd consisting of nine heifers and five cows, all grade Jerseys. The heifers are of a good type, and the cows are fair average herd animals. A young Jersey bull, "Dominion Success," with good butterfat records on both sides of his ancestry, has been secured from the Department's stud at Ruakura Farm of Instruction. Two pedigree Berkshire sows have also been obtained from Ruakura.

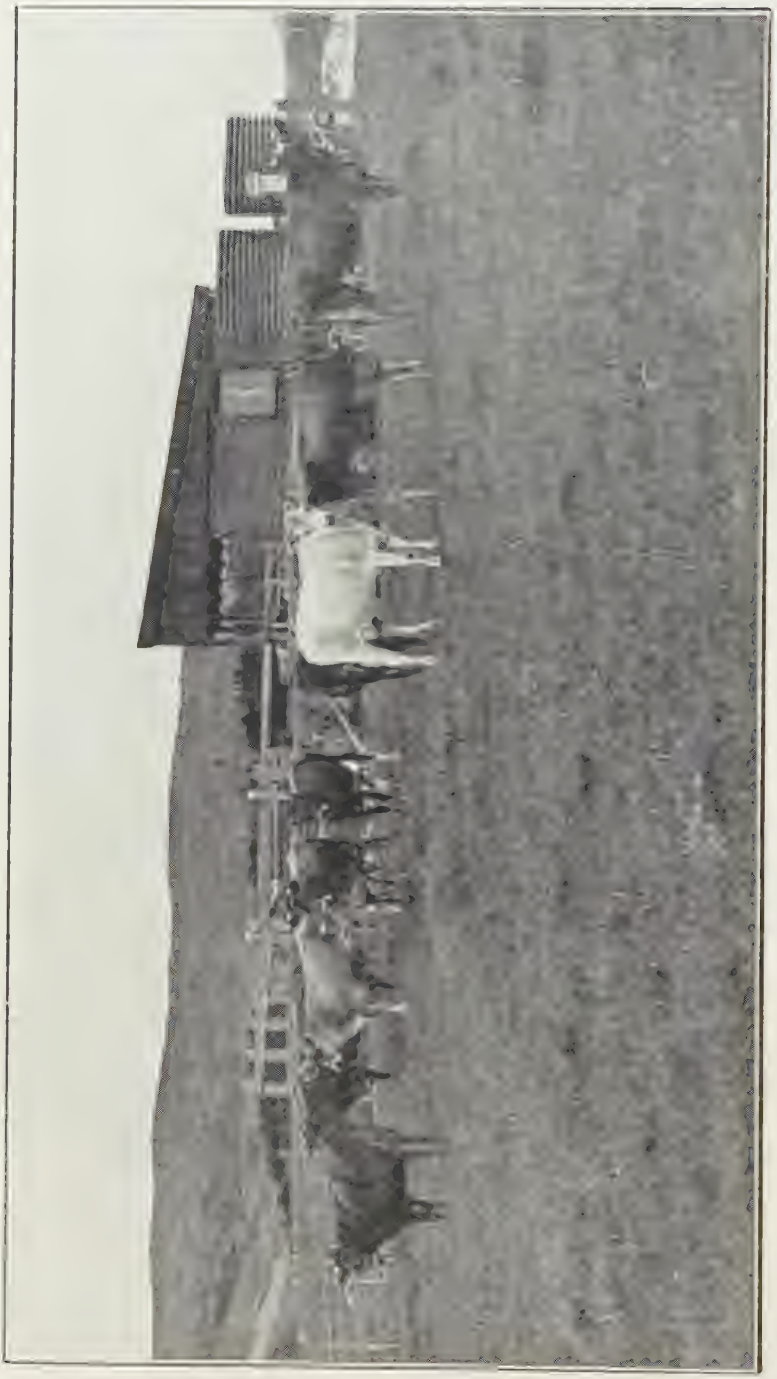
A house has been built for the manager. Altogether Puwera to-day has the appearance of making a prosperous dairy farm. The rich green of the pastures stands out in marked contrast to the surrounding virgin areas of hungry gum-land heath which stretch for miles around. Clumps of shelter-trees, mainly wattles, and also hedges, are improvements of value to the stock.

Another area of 180 acres, adjoining Puwera, was taken over from the Lands Department during the year, and it is our intention to break in to grass all but about 50 acres of this. When this is accomplished there will be a dairy farm of approximately 200 acres, on which it is expected a herd of sixty cows can be run successfully. This size of section is suitable, and should provide a living for a settler and family.

WORK OF PAST SIX YEARS.

During the past six years work at Puwera has been necessarily of an experimental nature. It has been pursued with two main objects: to treat the intractable stiff clay so as (1) to be able to establish a useful pasture on it, and (2) to be able to grow fodder crops successfully so that feed could be provided for stock all the year round, especially when the production from the pastures proved inadequate.

Both the objects have now been accomplished. The results achieved have been better than was anticipated. Pastures with a carrying-capacity of the equivalent of a cattle-beast to 2 acres have been established and maintained. The pastures show improvement from year to year. Ordinary stock- and pasture-management methods which are within reach of every farmer have been followed in accomplishing this. A list of suitable fodder crops grown successfully on Puwera is



PART OF THE DAIRY HERD AND THE MILKING-SHED AT PUWERA EXPERIMENTAL FARM.

now in our possession. This list includes crops which will provide feed when the pastures are more or less dormant in the winter, and others which give feed when the grass is usually dry in the late summer and autumn.

To reach to the point in gum-land development that we have attained to-day needed, of course, a good deal of experimental work in soil-treatment, including liming and manuring, grass-seed mixtures, crops, and variety trials. Many of the experiments gave negative results; others gave only partial results. It will be realized that any attempt to get at costs, and to place the whole work thus accomplished on a commercial basis, from the data supplied by the experiments carried out, cannot be accepted with certainty.

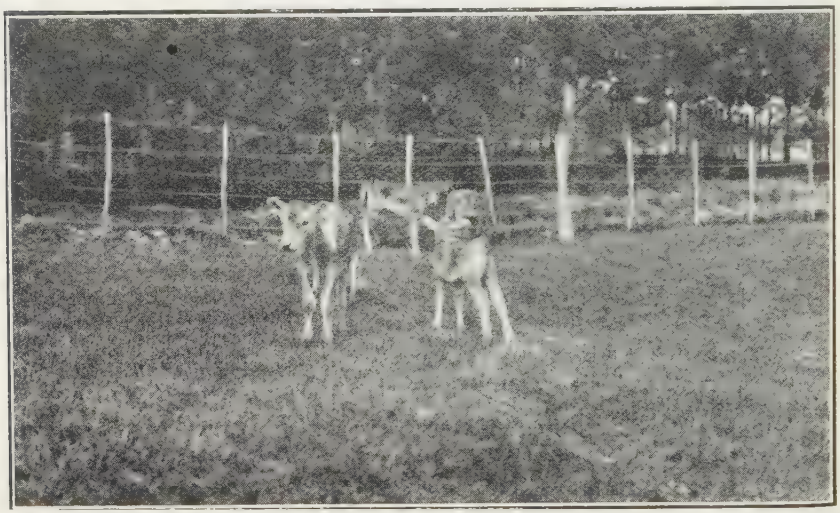
COST OF GUM-LAND DEVELOPMENT AND PASTURE-ESTABLISHMENT.

The matter of costs is a question of paramount importance. It is the problem to which the work on the new area at Puwera is now being directed. The breaking-in of the land is narrowed down, by reason of the previous six years' work, to clear-cut lines of soil preparation, manuring, seed mixtures for pastures, and treatment for other crops. Therefore the calculation of costs from the operations now in progress, and which have already been demonstrated as successful, will be a simple matter when the work is completed. About 50 acres of the area are ploughed, and it is intended to sow this portion in grass next autumn. Another 50 (probably 80) acres will be cultivated and sown in the autumn of 1927. By that time a sufficient area will be grassed to allow of a definite cost per acre being assigned to the breaking-in of the land. The methods used on the improved area are practicable. If they are proved to be profitable also (the writer feels confident they are), then the gum-lands of the heavier types can be used for profitable dairying.

Although it will be some time before a reliable statement can be made as to the cost of establishing pasture on gum-lands at Puwera, an estimate—which may later prove to be near the mark—can be given tentatively. At local-contract prices for the various operations, allowing for one ploughing, the necessary diskings and other cultivation, the grass-seed mixture, and manure and lime, £7 an acre will be sufficient. A second ploughing is certainly advisable; therefore another £2 must be allowed for that. Add £3 for fencing, and, with top-dressing and other costs, about £15 per acre would probably be a safe figure to cover the cost of establishment of pasture fit to carry dairy cows. If this figure be accepted, then the outlay to improve land to the level of production at Puwera—that is, 3 acres to a dairy cow—would be £45. This would enable settlers to follow dairying profitably on gum-land. If £20 an acre were allowed to break in the land, only £60 worth of land would be required to run a dairy cow. It will be seen that, basing land-values on present New Zealand standards, these costs would safely allow dairying to be carried on profitably. The cost of maintaining the pastures and providing necessary fodder in addition is not higher than in districts where dairying is intensive.

The chief difficulty for the utilization of these lands for farming is clearly one of finance. Looked at from the viewpoint of the individual prospective settler, this difficulty is very real. He would require too

much initial capital to face the work unaided. On the lower figure allowed for breaking in the land, he would require from £1,500 to £2,000 to break in a sufficient area for running a herd which would support him. Obviously, therefore, it would be more a matter for the State or for private enterprise on a considerable scale to bring the land into profit, when settlers could take it up and make a living off it. No doubt, for this reason, individual farmers seeking land, and having sufficient capital to tackle gum-land, will turn their attention for some time to come to improved areas where returns are more immediate.



IN THE CALF-PADDOCK AT PUWERA.
Showing a good sole of rye-grass and clover, and good shelter.

LAST SEASON'S OPERATIONS.

The main work at Puwera during the season of 1924-25, other than the seasonal operations on the improved area, was the cutting of manuka and filling-in of gum-holes on the 16 acres of land on the flat and on the northern side of the creek in Field 7. The manuka was about 10 ft. to 12 ft. high, and very dense. The soil on this portion of Puwera is the best quality on the farm. The portion of this area off the flat, and comprising the bulk of 16 acres now lying fallow, will be put into grass pasture in the coming autumn. The flat has been used for fodder crops for cattle and horses. A good crop of oats was taken off it last summer.

Pasture-management.

The pastures were top-dressed in June with basic slag at the rate of 3 cwt. per acre. The striking response of the pastures to slag is an outstanding feature of the work at Puwera. During the winter good growth was maintained, and, though the winter and late spring

were generally unfavourable, the pastures on Puwera came away early. Comparing them with pastures on the volcanic and other superior soils, the Puwera pastures were distinctly better. This is manifestly due in a large measure to the good effects brought about by regular top-dressing with a phosphatic manure best suited to the local conditions. The pastures are regularly harrowed with the tripod-chain harrows. This spreads the dung, and gives surface cultivation. The one evenly distributes the organic matter, so deficient in the virgin gum-land soil, while the other stimulates grass and clover growth by the surface stirring of the soil.

The fields at Puwera average from 10 to 12 acres in area. This is found to be a desirable size for getting good results from stocking. The small size of the fields allows of frequent resting in turn for short periods. This matter in pasture and stock management should certainly be given more attention by dairy-farmers than is generally the case in this Province.

Supplementary Forage.

Meadow hay was cut from 4 acres, and yielded about 10 tons of material. Oaten sheaves were also saved for horse-feed, yielding 9 tons. A surplus of both remained after the season's requirements were satisfied.

An area of 2½ acres in Field 7 was sown to mangolds, in wide drills, using the following varieties at the rate of 6 lb. of seed per acre: Mammoth Long Red, Jersey Queen, Golden Tankard, and Yellow Globe. The fertilizer mixture used was: Superphosphate, 3 cwt.; bone-dust, 1 cwt.; blood-and-bone, ½ cwt.; kainit, 1 cwt.; total, 5½ cwt. per acre. The yield over the area was estimated at 25 tons per acre.

One acre was sown in Garton's Superlative swede, at the rate of 10 oz. seed per acre; 2 cwt. of super mixed with 1 cwt. of bonedust per acre was applied with the seed. A crop was taken yielding about 15 tons of roots.

An area of ¾ acre was sown in maize, pumpkins, and marrows. Pukeko destroyed the whole of the maize; each season these birds are becoming more troublesome. The pumpkins and marrows gave a yield of 2 tons 5 cwt. 20 lb.

At the end of the season we had 3 tons of roots unused on hand, and these were sold to local farmers. After the dairy cows were put on the green oats, late in August, they would not eat the mangolds, swedes, nor hay.

INSTRUCTION TO FARMERS.

During the sessions of the winter farm-school held at Whangarei in May last an afternoon was devoted to Puwera. There were 120 farmers present, and they were shown over the Area. A total of about 350 farmers visited Puwera during the year. Right throughout North Auckland farmers are showing increasing interest in the work at the Area, and these visits prove helpful in providing general information from what is seen concerning farming.

WEATHER CONDITIONS IN 1924–25.

During the season under review the spring was favourable, with good rains. Grass-growth was therefore satisfactory. A dry spell set in in January, and the weather continued fairly dry until late in April. The winter proved favourable until towards the end. The spring was late, but the pastures came away well in September, and have done well since. The total rainfall was 49·76 in., and there were 164 days on which rain fell. The mean annual rainfall for Whangarei during the past thirteen years is 51·47 in.

EXPERIMENTS ON MANURING OF RAPE IN CANTERBURY.

F. E. WARD, H.D.A., Instructor in Agriculture, and A. W. HUDSON, B.Agr., B.Sc., Assistant Instructor in Agriculture, Christchurch.

IN the 1924–25 season three experiments on the manuring of rape were conducted in the Darfield district. The following manures were used: (1) Superphosphate, 42/44, 1½ cwt. per acre; (2) Ephos basic phosphate (containing about 62 per cent. of phosphate expressed as tricalcic), 1½ cwt. per acre; (3) a mixture of super and Ephos in equal parts by weight, 1½ cwt. per acre; (4) a mixture of 1½ parts of super to 1 of dried blood, 2½ cwt. per acre. Unmanured control plots were sown, but owing to the almost entire lack of growth on them weights were not taken.

METHOD OF SOWING.

As in the case of experiments in manuring of wheat (*Journal*, April, 1925), the adjustment of the drill to give the desired quantity was determined before the plots were sown. Each plot was one width of the drill, and each treatment was sown in quadruplicate, except in one case where sowings were triplicated, rain interfering before the fourth series could be sown.

The rape on areas ½ chain by a definite number of coulter-widths was cut at ground-level with sharp spades and weighed immediately. From three to eleven such areas were cut from each plot, according to whether the soil-variation was relatively great or small. There were therefore twelve to thirty-three plots weighed in each treatment. The differences in yield and degree of reliance attachable to such differences have been calculated from pairs of plots. The most centrally placed plot is used as the standard, and each area in it is compared with an adjacent area of another treatment, or with one separated only by one intervening plot.

EXPERIMENT 1: ON FARM OF R. S. GUNN, RACECOURSE HILL.

This experiment was carried out in a paddock which had been in grass for six years. The seeding was 4½ lb. per acre, in 7 in. rows. The plots were sown on 24th November, 1924, and weighed just over eight weeks later, on 21st January, 1925. A month after sowing, all plots which received super alone or mixed with Ephos or blood were

equally good, and superior to those having Ephos alone. On 6th January, six weeks after sowing, the Ephos plots were still lagging behind, and the super-and-blood plots were superior to any. The accompanying photograph shows the plots at this stage. The Ephos plots

A TYPICAL PORTION OF THE EXPERIMENT, ON MR. GUNN'S FARM SIX WEEKS AFTER SOWING.

The control plots, almost bare of growth, are seen in the background on both sides. Between the controls the order of plots, from right to left, is (1) super-and-blood treatment, (2) super, (3) Ephos, (4) super and Ephos.

appeared to be ripening off, although at the time of cutting they were less ripe than the super and super-and-Ephos plots, as also were the super-and-blood plots. The results of the weighings are shown in the following table:—

Table 1.

(Area of plot weighed, $\frac{1}{377}$ acre.)

Treatment other than Super.	Number of Paired Plots.	Tons per Acre.		Differences*: + In Favour of Super. − In Favour of other Manure.	Odds in Favour of Difference being Significant.
		Yield of Treatment other than Super.	Yield of Super.		
Ephos	12	4·78	7·05	+ 2·27	>9,999
Super and Ephos ..	12	6·76	7·05	..	11
Super and blood ..	12	8·08	7·05	− 1·03	>9,999

* Where the odds are less than 30 to 1 in favour of a difference being significant such difference is not regarded as being due to the treatment, but to chance variation, and is not shown in the "Difference" column.

EXPERIMENT 2: ON FARM OF J. SYMES, DARFIELD.

The plots were sown on 29th October, 1924, on a paddock which had been in grass for four years, and weighed on 19th January, 1925, twelve weeks after sowing. The seeding was at the rate of $2\frac{3}{4}$ lb. per acre, in 7 in. rows. The crop was inspected on 25th November, when all plots receiving some super were equally good, and much better than the Ephos treatment. When the weighing was done the super and super-and-Ephos plots were slightly riper than the Ephos and super-and-blood plots, which were at about the same stage of ripening. It was estimated that the controls (unmanured plots), which in this experiment were better than in the other two cases, had about a quarter the crop of that on the manured plots. The following table shows the results of weighings:—

Table 2.

(Area of plot weighed, $\frac{1}{568}$ acre.)

Treatment other than Super.	Number of Paired Plots.	Tons per Acre.		Differences: + In Favour of Super. − In Favour of other Treatment.	Odds in Favour of Difference being Significant.
		Yield of Treatment other than Super.	Yield of Super.		
Ephos	33	9·08	9·21	..	0·5
Super and Ephos ..	33	9·18	9·21	..	..
Super and blood ..	33	11·11	9·21	−1·90	>24,000

EXPERIMENT 3: ON FARM OF W. W. MULHOLLAND, DARFIELD.

The rape crop in this case followed two seasons of wheat preceded by a fallow after grass. The plots were sown on 10th October, 1924, and weighed on 10th January, 1925, having had a growing-period of thirteen weeks. The seeding was at the rate of $1\frac{1}{8}$ lb. per acre, the sowing of seed and manure being done in 14 in. rows.

In this experiment some difficulty in getting correct adjustment of the drill was experienced, and the actual quantities of the several manures sown were as follows: (1) Super, 148 lb.; (2) Ephos phosphate, 138 lb.; (3) super and Ephos, 143 lb.; (4) super and dried blood, 300 lb.

Table 3.

(Area of plot weighed, $\frac{1}{377}$ acre.)

Comparison: A *versus* B.	Number of Paired Plots.	Tons per Acre.		Difference in Favour of A.	Odds in Favour of Difference being Significant.
		Yield of A.	Yield of B.		
A, Ephos; B, super	12	5·39	5·01	0·38	63
A, Ephos; B, super and Ephos	16	5·20	5·07	..	7
A, super and blood; B, super	12	5·78	5·01	0·77	1,666

Six weeks after sowing, the super-and-blood plots showed the greatest growth, with super and super-and-Ephos slightly superior to the Ephos alone. At the time of cutting and weighing, the super-and-blood plot was still superior, but no difference between the other manured plots could be distinguished. The yields are given in Table 3, the super and super-and-Ephos being compared with Ephos alone, and super-and-blood compared with super.

CONCLUSIONS.

(1.) The addition of 1 cwt. of dried blood to the super has caused an increase in yield in every case. Owing to the difficulty of placing a value on the rape crop it is not certain to what extent this increase pays, and no definite conclusion will be drawn until further trial has been given and data regarding the return from the rape crop collected.

(2.) In all cases the super-and-Ephos mixture has yielded as well as super alone. (In 1924 super, 42/44, cost £7 5s., and Ephos £6 15s., per ton. The mixture costs 5s. per ton less than the straight-out super. Hence it does not appear that there would be any great advantages to be gained by mixing.)

(3.) Table 1 shows that the super plots are markedly superior to the Ephos plots after eight weeks of growth. As the growing-period is extended the advantage is less marked, and in Table 3 the Ephos has a slight advantage over the super. However, the fact that the rows were wider apart in this instance renders a strict comparison and conclusion unwise.

(4.) Ripening is delayed by the Ephos as compared with super, and by the addition of blood to super.

We are greatly indebted to Messrs. Gunn, Symes, and Mulholland for assistance in carrying out the work on their respective farms. The experiments are being repeated in the present season.

FAULTY CREAM DUE TO STAGNANT WATER.

THE following extract from a report by Mr. W. G. Batt, Farm Dairy Instructor to the Kaitieke Co-operative Dairy Company, may be of interest to cream-suppliers and to dairy companies generally which are endeavouring to improve the quality of their produce:—

"An unusual case of inferior cream came under my notice at the end of September at the Piriaka Factory. A supplier, whose farm is fairly close to the factory, had been supplying superfine cream grading 93 points, and which suddenly fell to second grade—87 points. The manager referred to this cream as "very unclean," and suggested that conditions on the farm were possibly not all that could be desired. Knowing, however, that the farmer concerned was scrupulously clean and had up-to-date appointments, I hardly credited the idea, and found, upon investigation, that the trouble was due to bacterial contamination from stagnant water. During the period of superfine grade cream the herd had been on high country, but had then been moved to levels that were very wet and had a prolific growth of water-grass in much of the stagnating water. In eating quantities of this grass the cows consumed

a considerable amount of the roots, which were well saturated and had a strong odour. Next day I took out and installed a cooler at the farm, and when the cream next arrived at the factory it was regarded as superfine. A quantity, however, was held over for examination and kept under normal temperature for about twelve hours. Examination after that time showed that it had deteriorated to a remarkable extent, having a strong odour and very unpleasant taste—a cream decidedly second grade. It was apparent that the cooler had retarded the development of the bacteria causing the trouble while the cream was on the farm, and sufficiently long for it to arrive at the factory in good condition. Immediately it left the farm, however, and probably with a slight rise in temperature, the bacteria had quickly turned the cream into an article of very inferior quality.

"Time did not permit of a curd test being made of this particular milk, but no doubt it was a case in which the curd test or other simple means of the sort would be a decided help to cream-graders."

—*Dairy Division.*

PESTS IN IMPORTED BULBS.

PACKING AND TRANSIT TESTS INITIATED.

THE unsatisfactory state in which bulbs from the United Kingdom and the Continent of Europe have been coming to hand for some time past has been the cause of dissatisfaction not only to New Zealand importers, but to those in other parts of the world, including the Australian States and Canada. The matter has recently been the subject of correspondence between the New Zealand Department of Agriculture and the High Commissioner and the Ministry of Agriculture in London, with a view to devising a more satisfactory state of affairs, if possible.

Prior to his departure for England in January last, Mr. T. W. Attwood, of the New Zealand Fruitgrowers' Federation, was commissioned to go into the matter with the authorities, and was provided with full information on the subject, together with specimens of affected bulbs. Later Mr. J. G. Myers, of the Department's Biological Laboratory, who was attending the Entomological Conference in London, joined in the investigations.

Eelworm and bulb-mite are the main causes of damage to bulbs. The mite increases rapidly on dead and decaying bulbs, and the position is generally aggravated by humid conditions in the packages, largely due to faulty packing and to unsuitable stowage in transit.

The whole position having been thoroughly gone into in London, it was decided to institute packing, carriage, and stowage tests, and in pursuance of this decision officers of the British Ministry of Agriculture made the necessary arrangements. A consignment of bulbs, representing the first of a series of tests, was forwarded by the s.s. "Corinthic," which arrived at Wellington on 22nd October. Through the co-operation of the Shaw, Savill, and Albion Company, the packages were carried at varying temperatures, ranging from 40° to 80° F.

Nothing that would indicate a solution of the difficulties was gained from this shipment, as the whole of the bulbs arrived in excellent condition. Even duplicate sets that were artificially infected with bulb-mite and forwarded at the same time, also those forming part of the experimental sets transmitted by ordinary parcel-post, showed no sign of the mites having developed, or other deterioration. The experiments will be continued, however, and it is hoped that later shipments will provide more useful information.

—*Horticulture Division.*

AGRICULTURAL EDUCATION IN NEW ZEALAND.

REPORT OF THE BOARD OF AGRICULTURE.

(Concluded from October Issue.)

THE remaining portion of the Board's report deals with matters directly related to agricultural education on which the Board desires to express its opinions, although these matters were not explicitly included in the order of reference.

1. TRAVELLING SCHOLARSHIPS.

In regard to post-graduate training in agriculture, the Board, besides recommending that provision should be made at one or more of the University Colleges for the training of research students in connection with agriculture, also recommends that the Government should provide for one agricultural travelling scholarship each year, tenable for two years, to enable post-graduate students to travel abroad in order to obtain further education in agricultural science.

2. ENDOWMENTS.

The value of endowments of land was brought forcibly before the Board on several occasions. For example, the Wesleyan Church in Auckland has been able to purchase a farm of 700 acres of land, to spend £23,000 on buildings, and to start a very successful and well-managed farm boarding-school thirty miles out of Auckland, on an endowment which was originally of little value, but is now worth some £250,000. In fifty years' time there will certainly be Agricultural Colleges attached to all the Universities in New Zealand, and if 100,000 acres of land of little present value, such as the Hautu Block in the centre of the North Island, were set aside as an endowment for agricultural education, the examples we have before us warrant the expectation that the income from such lands would ultimately go far towards meeting the expenses and upkeep of the Agricultural Colleges. Lincoln College itself is the result of the far-sighted policy adopted by the public men of Canterbury when under the Provincial Government they set aside lands to provide the wherewithal for an Agricultural College.

3. AGRICULTURAL EXTENSION WORK.

The evidence showed that when the instructors under the Department of Agriculture were able to get into close touch with the farmer and to gain his confidence the demand for instruction was insistent, and the instructors were unable to cover the large districts allotted to them. Many witnesses testified to the value of short winter courses conducted at State farms or other centres by the trained officers of the Department, and to the excellent use which is made of the winter short course in various branches of agriculture in other countries, such as the United Kingdom, Denmark, Holland, Canada, and the United States of America. The Board therefore recommends that provision should be made at suitable centres, including Farm Training Colleges, for winter short courses, to give an opportunity to farmers to further their education, and that the number of instructors in agriculture be increased in both Islands, provided that new appointees should have taken the B.Sc. or B.Ag. degree.

4. BOYS' AND GIRLS' AGRICULTURAL CLUBS.

It was shown in evidence that whenever boys' and girls' clubs were properly organized they greatly helped to awaken the interest of both parents and children in agricultural education. It was clear, however, that such clubs should be organized by experts, and that if the work devolved on the instructors in agriculture it would occupy more time than they could spare from their other duties. The Board therefore recommends that the movement be encouraged, and that the Government should appoint an officer to organize the clubs. The Board also suggests that agricultural bursaries might be awarded to boys distinguishing themselves in the competitions arranged by the clubs.

5. TRAINING AND CLASSIFICATION OF TEACHERS.

During the inquiry the evidence brought before the Board tended to show that as far as the subjects of agriculture and nature-study are concerned, provision was wanting in the teachers' training colleges for the trainees to acquire a knowledge sufficient to fit them for the proper teaching of pupils in the primary schools so that nature-study should be made attractive and the children trained to make careful observations in the district around them. It is not, of course, feasible to teach agriculture in the primary schools, but practical work in nature-study can be made at least as powerful an instrument for developing and training the mind as the more academic studies, and at the same time a knowledge and love of rural life and work can be instilled into the pupils. A pupil so trained would be prepared to take full advantage of a suitable rural course in a district high or other post-primary school, and could then pass on to a Farm Training College and be able at once to take advantage of the specialized training which the college would offer.

In order to provide an appropriate course in rural science and nature-study for teachers in training colleges it would be necessary to give the training college sufficient land to allow for experimental work by the students in garden and nursery. In Dunedin the Training College has the use of municipal reserve lands adjoining the Botanical

Gardens, and a similar provision in the other centres would be of great value. The municipal authorities might well be asked to grant the use of part of the Town Belt or other reserve for the purpose, since the proposal would not involve the sacrifice of any open-air space, but on the other hand would tend to beautify them.

With a view to encouraging teachers to take up seriously the study of rural science and agriculture, the Board considers that these subjects might well be made compulsory in the courses for teachers in training, or, if this were not found practicable, the Board recommends that special weight should be given to the subject of nature-study and agriculture in the Teachers' D and C Examinations and in the training-college course for primary-school teachers, and that grading-increment be given for proficiency in agriculture and nature-study. In this recommendation the Board had in mind the practice in Holland, where, according to the evidence of Dr. Lotsy, teachers in the primary and high schools who have a special teacher's diploma in agriculture receive a special salary-increment whether they are actually teaching the subject or not.

In connection with the science work in the primary schools, and the supervision of the teaching in nature-study and rural science, the Board desires to call attention to the work of the itinerant instructors in agriculture who are employed by the several Boards of Education. These men are usually well qualified, and are doing excellent work in training both pupils and teachers, besides paying attention to the laying-out of school-gardens and helping the officers of the Department of Agriculture to control and judge the agricultural-club competitions for girls and boys. The numbers given in the preface to this report show that additional instructors must be appointed if the supervision is to be adequate. The Board is also of opinion that the short courses in rural science and agriculture arranged for the teachers by these instructors are of great value and should be encouraged, and that for this purpose the resources of the Department of Agriculture should be used to the fullest extent possible, so that the teachers may be able to get first-hand information of the results of the investigational work of the Department of Agriculture, as well as gaining some practical experience under the direction of the expert instructors in the Farm Training Colleges.

6. POST-PRIMARY SCHOOL COURSES.

At a recent meeting of the University Senate the Chancellor prominently stressed the fact that although agriculture was the greatest industry in the Dominion it was largely neglected in our schools. The Board had evidence that only about 10 per cent. of the boys in high schools take agriculture, although about 30 per cent. enter the industry after leaving school. The Board therefore made particular inquiries to find out why the subject should be so neglected. Educationists were asked whether they thought that the subject was not of sufficient educational value to be made a leading feature of the curricula of secondary schools. The replies indicated that a proper treatment of rural science and elementary agriculture in the high school would provide as fine mental training as could be had in any other way. In fact, Mr. Tate, Director of Education in Victoria, gave

evidence that in his experience, though the study of agriculture apparently retarded the progress of the boys in the general subjects in the first year, yet in the second year the agricultural students were well to the front, and this he attributed to the fact that " many of the boys dealing merely with words in English or Latin were in the habit of reading books, and that when they got into a difficulty they turned to a dictionary, and had an attitude of mind entirely different from that of boys who were facing realities and being taught to think in terms not of words, but of things." Mr. Tate strongly expressed the opinion that " the boy who is well trained in agricultural science, and who uses the practical work, either in experimental plots on the school-farm or on a big scale, is getting a training that is very hard to beat in any school subject." The same view was expressed by officers of the Education Department, and also by other educationists. It was thus clearly established that the proper treatment of agricultural science in the high schools would not only be of immense benefit to the industry, but would also form one of the most valuable factors in the general education of the pupils.

There was also ample evidence that the Department of Education and the various Boards controlling post-primary schools were sedulously trying to make agricultural science a strong subject in the curriculum by providing facilities for teaching the subject considerably beyond the immediate demand for instruction. There being, therefore, no natural reason for the relative neglect of the subject, the Board was forced to the conclusion that some artificial restraint was at work to prevent it from becoming popular. Such a restraint was found in the conditions of the Matriculation Examination, which at present dominates the curricula of the secondary schools. Agricultural science has only been recognized as a half-subject for the Matriculation Examination since 1916—that is to say, it may be taken as an alternative to botany or physiology in the second paper in the optional subject of natural science. The Matriculation Examination is a written examination (although certificates of having completed a practical course are required in connection with science subjects), and in consequence a a book-work subject pays better than a practical subject for the time spent in preparation.

Also, agricultural science was not included among the subjects for the degree of Bachelor of Arts until 1922, so that a pupil taking this subject for matriculation could not, until recently, take it also for the ordinary degree in arts. Hence few teachers in secondary schools have had any considerable training in agricultural science, and the natural trend has been towards more academic studies which have behind them the weight of many years of careful organization. The result is that pupils are handicapped so far as the Matriculation Examination is concerned by taking agricultural science, even if they propose to take a University course leading to the degree of Bachelor of Agriculture, and in consequence most pupils take subjects which tend rather to wean them away than to incline their hearts towards rural pursuits.

Evidence showed that the question of modifying the Matriculation Examination was being discussed by the Senate of the University, and that the Education Department and the teachers in post-primary

schools were alive to the need for reform. It is possible that some kind of accrediting system whereby the pupil might be matriculated on the recommendation of the school authorities, or other authority recognized by the University, might be adopted with advantage, so that the schools would be less tied down to a single course for pupils wishing to matriculate, and other courses of a less academic character, but of equal or superior educational value, would be able to attract their share of the keener students.

The Board wishes to express the opinion that the evidence before it shows—(i) That the courses in secondary schools are dominated mainly by the requirements of the Matriculation Examination; (ii) that elementary agriculture and nature-study are taken by only a small proportion of the boys in post-primary schools.

The Board is strongly of opinion that the subject of elementary agriculture and nature-study should be taken by all boys as a carefully correlated extension of the work done in nature-study in the primary schools, and therefore recommends that this subject should be compulsory in the courses for the Public Service Entrance, Intermediate, and Matriculation Examinations. The Board is further of opinion that any pupil taking the agricultural course in a secondary school, district high school, or technical school should be entitled to receive a "lower leaving-certificate" in respect of such course, provided that a satisfactory standard has been reached by the pupil in English and the special subjects of the agricultural course. The Board suggests that such standard might be fixed by an Inspector of the Education Department, in consultation with the Principal of the school.

7. AGRICULTURAL HIGH SCHOOLS.

In order to cater more especially for those pupils who intend to enter on a degree or diploma course in agriculture at a University College, and to fill the gap between the primary-school work in nature-study and the professional courses in agriculture in the University, the Board recommends that in suitable centres high schools having a special section for agricultural teaching should be established, with hostels attached, and that the Principal of such a school should have a science degree (preferably B.Ag.) so as to be able to give students a suitable preparation for entering on the diploma or degree course in agriculture at the University. The evidence clearly showed that where high schools in rural centres surrounded by a large agricultural population were under the direction of suitable teachers holding science degrees, and managed by a Board of Managers in sympathy with the agricultural work, they were eminently successful. It was also noted that such success, while primarily due to the skill and enthusiasm of the teachers, was very considerably promoted by local interest and local financial support.

The Board therefore, without specifying any particular district where Agricultural High Schools should be established, thinks that the success of the whole scheme of agricultural education would be greatly furthered by the founding of such schools in places where the settlers themselves are prepared to come forward in support of the school and the teachers.

The Board further recommends, failing the adoption of a satisfactory system of accrediting students to the University, that there be instituted an agricultural preliminary examination in place of the Matriculation Examination for the degree of Bachelor of Agriculture, such examination to be the same as that of Matriculation, with the exception that an additional science subject may be taken in place of a foreign language.

SUMMARY OF RECOMMENDATIONS OF THE BOARD.

The Board recommends—

College of Agriculture :—

(1.) That one fully equipped and fully staffed residential College of Agriculture will be sufficient for many years to come, and that such an institution should not be established until a sufficient number of degree students is available, and, when established, should be placed in a central position.

(2.) That in the meantime—

(*a*.) Provision should be made for the training of degree students by erecting laboratories and class-rooms at Wallaceville in connection with Victoria College, at a cost of some £15,000, and by transferring to the same site the Biological and Chemical Laboratories of the Agriculture Department, so that they and the existing Veterinary Laboratory and the proposed Dairy Research Laboratory, together with the expert staff, should be available in connection with the instruction of students, to the mutual advantage of the students and the Department :

(*b*.) The Ruakura Farm Training College be made available for co-operation with the Auckland University College :

(*c*.) Provision be made for accommodating additional students at Lincoln College by way of laboratories, class-rooms, and hostel accommodation ; that a grant of £20,000 be made by the Government for this purpose ; also that an additional grant of £500 per annum be paid to Lincoln College to enable the plant-breeding and other experimental work to be developed.

II. *Farm Training Colleges* :—

(1.) (*a*.) That laboratory and class-room accommodation be provided at Ruakura, at a cost of about £2,100 : and

(*b*.) That Penrose Farm, near Masterton, be developed into a Farm Training College, at a cost for additional buildings of about £7,000.

(*c*.) That the provision for training of students in Farm Training Colleges be increased as students become available, either by additions to existing institutions or by the establishment of new ones.

(2.) (*a.*) That Farm Training Colleges should be under the control of a Board consisting of the Ministers of Agriculture and Education, also one representative of each of these Departments, and three members of the Board of Agriculture, including the President.

(*b.*) That the curriculum should be made as short and intensive as seasonal conditions will allow.

(*c.*) That the work should consist mainly of demonstrations on farm methods and management, class and laboratory work, including a minimum of actual farm labour on the part of the student.

(*d.*) That the main subjects dealt with should be soils, fertilizers, crops, live-stock breeding and management, farm-management, farm economics, and horticulture.

(*e.*) That the staff should consist of a College Principal, an agricultural graduate for every thirty students, a farm overseer, skilled farm-workers capable of giving instruction in their special crafts, a horticulturist, and the necessary domestic staff.

(*f.*) That 200 acres of first-class land or its equivalent would suffice for the purpose of a Farm Training College.

III. *The Smedley Estate, Hawke's Bay :—*

(*a.*) That the estate continue to be managed by the Department of Agriculture, in association with the Public Trustee.

(*b.*) That the sum of £1,300 per annum should be allocated from the income, £1,000 for twenty-five bursaries to enable Hawke's Bay boys to obtain a training in agriculture, and £300 for a scholarship or scholarships to enable a selected Hawke's Bay student or students to take a degree course in agriculture; any balance not used in any one year to revert to the trust.

(*c.*) That suitable land be procured in Hawke's Bay out of the income of the estate for a Farm Training College to be established as soon as the need of such a college in Hawke's Bay has been demonstrated, such land to be used in the meantime as a demonstration farm.

IV. *Post-graduate Training :—*

(*a.*) That research work in agricultural problems should be encouraged at one or more of the University Colleges and at research stations, such as the Cawthron Institute at Nelson, at which special facilities for post-graduates training in agricultural work should be provided.

(*b.*) That a travelling scholarship be established to enable selected post-graduate students to proceed abroad for the purpose of furthering their education in agricultural science.

V. *Endowments* :—

That considerable areas of land of little present value, such as the Hautu Block in the centre of the North Island, should be set aside, where possible, as endowments for agricultural education.

With regard to matters not explicitly included in the order of reference the Board makes the following suggestions :—

1. *Agricultural Extension Work.* — That the number of instructors in agriculture in both Islands be increased, provided that new appointees should have taken the B.Sc. or B.Ag. degree.

2. That the number of agricultural instructors engaged in advising teachers and in directing the nature-study and elementary agriculture in primary and post-primary schools should be increased.

3. *Training and Classification of Teachers* :—

(*a.*) That improved facilities be given for training teachers in nature-study and elementary agriculture.

(*b.*) That these subjects should be made compulsory in the D and C Examinations.

(*c.*) That teachers attaining to proficiency in these subjects should receive grading-increments.

(*d.*) That the training colleges should be provided with land for experimental plots and for nurseries.

4. *Boys' and Girls' Agricultural Clubs* :—

(*a.*) That the movement be encouraged, and that to this end the Government should appoint an officer to organize the clubs.

(*b.*) That agricultural bursaries should be awarded to boys distinguishing themselves in the club competitions.

5. *Post-primary School Course.*—That, in view of the comparative neglect of agriculture in the post-primary course, due to the present conditions of the Matriculation Examination,—

(*a.*) Elementary agriculture and nature-study should be made compulsory in the courses for the Public Service Entrance, Intermediate, and Matriculation Examinations.

(*b.*) That a lower leaving-certificate should be given in respect of the agricultural course in a secondary school, district high school, or technical school, provided that a satisfactory standard is attained in English and the special subjects of the agricultural course.

6. *Agricultural High Schools.* — That in order to cater more especially for those pupils who enter on a degree or diploma course in agriculture at a University College, and to fill the gap between the primary-school work in nature-study and the professional courses in agriculture in the University, Agricultural High Schools should be established wherever the settlers themselves are prepared to come forward in support of the school and the teachers.

7. *Accrediting System: Agricultural Preliminary Examination.*—That a system of accrediting students to the University should be established as soon as possible, and that in the meantime an agricultural preliminary examination should be instituted in place of the Matriculation Examination for the degree of B.Ag., such examination to be the same as that of Matriculation except that an additional science subject may be taken in place of a foreign language.

JAMES G. WILSON, President, Board of Agriculture; JAMES BEGG, G. L. MARSHALL, E. AVERILL, EWEN D. MCLENNAN, DAVID MARSHALL, WM. B. GRANT, W. D. PIKE, WM. PERRY, D. W. WESTENRA, EDWIN HALL, Members, Board of Agriculture; GEO. FOWLDS, Representative, New Zealand University Senate; W. S. LA TROBE, Representative, Education Department; C. J. REAKES, Representative, Department of Agriculture.

ADDENDUM TO REPORT.

Mr. G. L. Marshall adds the following note:—

While fully in accord with the above report as far as it goes, I am of opinion that a site for a Central College of Agriculture of University rank should be selected on the main arterial road between Auckland and Wellington, so that the necessary planting and preparation of the property can be gone on with until funds are available for the establishment of the college. The most suitable and central site would be the Marton, Feilding, or Palmerston North district. Marton is geographically more central than any other, and the railways from Taranaki, Wanganui, Auckland, Wellington, and Hawke's Bay via Palmerston all give easy access to the district. The land and climate are also very suitable for the purpose (*vide* Professor Peren's report). A slight alteration to the Agricultural College at Lincoln will serve the needs of the South Island.

Viticulture in New Zealand.—The yield from wine grapes during 1924–25 is estimated at 85,000 gallons of wine, valued at approximately £34,000. The returns from dessert grapes grown under glass are estimated at £32,000 in value for the same period.

Sheep Returns.—The total number of breeding-ewes—13,715,223 head—shown in this year's sheep returns constitutes a New Zealand record for this class. Another feature is the further recovery in Merinos, which increased to 1,005,451 head from 903,758 in 1924.

Blackleg.—The annual report of the Live-stock Division for 1924–25 states that the position as regards this disease continued to be satisfactory, and no cases were discovered outside the known areas. The inoculation of calves was continued in the Taranaki District, and was carried out on farms in the Auckland District where the presence of the disease had been confirmed, or where there were reasonable grounds for suspecting that blackleg existed. The number of calves inoculated for blackleg in the Taranaki area was 29,261—a decrease of 16,179 on the previous year's figures.

TESTING OF PUREBRED DAIRY COWS.

CERTIFICATE-OF-RECORD LIST FOR SEPTEMBER AND OCTOBER.

W. M. SINGLETON, Director of the Dairy Division.

THE accompanying list, giving particulars of the records of cows which received their certificates during the months of September and October, is strong in both number and quality of records. Many of the performances are deserving of special reference, but the list is so long that, for the most part, the figures must be left to speak for themselves, confining brief notice to a few of the more salient records.

JERSEYS.

Keston Flower, who heads the junior two-year-olds in this list, also becomes leader of her class for the Jersey breed. She is owned by Mr. G. E. Yelchich, of Waiuku, and displaces Mr. F. J. Saxby's Alfalfa Pansy (690·16 lb. butterfat). Keston Flower commenced her test at the age of 1 year 359 days, and produced 694·28 lb. butterfat from 11,472·2 lb. milk in 365 days. Her pedigree contains many names well known to those interested in the Jersey breed, and she probably gains much of her quality from Eminent's Fontaine, who appears twice on the sire's side, and from Majesty's Fox, who appears twice in the female half of the pedigree. Keston Flower was bred by Mr. C. B. Herrold, Waiuku, who bred and tested her dam, Floral Fox (C.O.R. 469·58 lb. butterfat).

Tulip's Minta May, in the same class, is a good runner-up. Her record of 660·44 lb. butterfat should be an encouraging result of a first year's testing for her owner, Mr. H. Cole, Tikorangi.

In the mature class Mr. R. R. Dean's Dianella, with 825·42 lb. butterfat, has produced more than creditably. She already had a C.O.R. for 572·92 lb. butterfat as a senior two-year-old.

FRIESIANS.

Bainfield Topsy 10th, a junior four-year-old, is shown with 863·89 lb. butterfat; she also has a junior three-year-old C.O.R. for 468·41 lb in 221 days. She was bred by Mr. W. D. Hunt, Waikiwi, on whose farm she gained her first certificate; her second C.O.R. was won under the testing of Mr. O. A. Cadwallader, Greytown.

The mature section includes the name of Mr. T. H. Richards's Monavale Queen Bess, whose yield of 950·90 lb. butterfat certainly places her among the high producers of the breed. Her consistency and constitution are demonstrated by the fact that she already has two C.O.R.s on high productions—namely, 740·50 lb. as a junior two-year-old and 800·18 lb. as a junior three-year-old, giving her the leadership of both these classes. She is from the stud of Mr. C. C. Buckland, late of "Monavale," Cambridge, who laid the foundation for many of the Friesian breed's high producers.

Next below Monavale Queen Bess appears Coldstream Magpie Domino, whose record of 924·47 lb. butterfat is of outstanding merit. She also has a C.O.R. for 586·27 lb., gained on a test commenced at the

age of 1 year 347 days. Coldstream Magpie Domino was bred and tested by Messrs. G. A. Marchant and Sons, Cardiff, Taranaki.

It will be noted that a third 900 lb. Friesian appears in this list, Zozo 2nd of Ashlynn having yielded 905·89 lb. butterfat. This is her second C.O.R., her record in the preceding season being 555·44 lb. Zozo 2nd of Ashlynn was bred by Mr. C. A. Hopping, and gained both her C.O.R.s at the farm of her present owners, Messrs. John Court, Ltd., Auckland.

AYRSHIRES.

The list contains a new Dominion champion for the Ayrshire breed. Mr. A. Montgomerie's Glencairn Brownie has gained the leadership of the mature class, and her performance also constitutes the highest C.O.R. Ayrshire production in New Zealand. She commenced her record at the age of 8 years 360 days, and in 365 days yielded 15,579·4 lb. milk containing 728·05 lb. butterfat. This record exceeds that of Mr. A. M. Weir's Ivanhoe Fancy, the previous highest Ayrshire producer, by 14·12 lb. Congratulations are extended to Mr. Montgomerie on his success.

The class-leaders of the Ayrshire breed are gradually but surely advancing to a very creditable stage, and this should be an encouragement to breeders of purebred Ayrshires to place their favourite stock under C.O.R. test in larger numbers than formerly.

LIST OF RECORDS, SEPTEMBER AND OCTOBER, 1925.

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS.						
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Keston Flower† ..	G. E. Yelchich, Waiuku ..	1 359	240·5	365	11,472·2	694·28
Tulip's Minta May ..	H. Cole, Tikorangi ..	2 0	240·5	344	10,617·0	660·44
Abberley Susie ..	W. T. Williams, Pukehou ..	1 349	240·5	365	11,310·8	585·24
Waipiko Combine ..	S. H. Wearing, Richmond ..	1 272	240·5	365	10,503·3	570·60
Reid Park Maple Leaf	J. H. Sherrard, Otaua ..	1 317	240·5	365	10,453·5	558·68
Rexcourt Queen ..	J. J. Goodwin, Morrinsville	2 19	242·4	365	9,864·2	519·32
Ngahiwi Lady Bountiful	W. J. Freeth, Waitara ..	1 347	240·5	364	8,413·8	512·25
Marshland's Starlike†	W. J. Chynoweth, Pukeroro	1 346	240·5	365	7,874·0	497·40
Heatherlea Alsike ..	H. J. Lancaster, Levin ..	2 40	244·5	365	9,545·2	493·48
Tirvean Nursing Sister	R. W. B. Evans, Weraroa ..	1 276	240·5	365	10,118·5	491·03
Swan's Fox's Moo-o	Brakenridge and Pearson, Taupaki	1 360	240·5	335	7,713·7	483·86
Beresford Belle ..	T. Brownlee, Pukekohe ..	1 363	240·5	365	7,147·1	483·29
Vernon Silver Rose ..	G. R. and H. Hutchinson, Auckland	1 352	240·5	365	7,535·5	478·81
Vernon Primula ..	G. R. and H. Hutchinson, Auckland	2 16	242·1	365	8,742·1	473·48
Vernon Cherry Bloom	G. R. and H. Hutchinson, Auckland	1 241	240·5	365	8,114·7	472·72
Ivondale Dolly Grey	P. J. Petersen, Brixton ..	2 15	242·0	365	8,464·9	470·03
River View Lady ..	H. Doel, Taumarere ..	2 22	242·7	365	6,887·8	467·82
Earlston Lady ..	Chisholm Bros., Hunterville	1 343	240·5	365	8,455·0	467·06
Pukatea Furze Blossom	G. R. Bell, Waipuku ..	1 331	240·5	365	7,612·2	467·30
Vibrona's Princess ..	J. R. Colson, Waihou ..	2 1	240·6	363	8,028·6	463·11

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat reqd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Double Dahlia ..	A. J. Harris, Bombay ..	1 322	240·5	349	7,440·1	460·37
Waimoeiti Jacobine ..	W. D. Dron, Spring Grove	1 313	240·5	305	7,433·3	458·71
Penrose Molly ..	J. B. Clemow, Stratford ..	1 341	240·5	305	7,950·8	456·40
Jersey Lea Zita ..	S. Bowker, Ihakara ..	1 308	240·5	305	7,502·7	451·46
Anne of Aria ..	M. V. Reeve-Smith, Aria ..	2 38	244·3	344	8,345·7	446·09
Earlston Creamy ..	Chisholm Bros., Hunterville	2 6	241·1	305	7,166·3	443·68
Gowanlea Lady ..	J. Robb, Westmere ..	2 4	240·9	305	7,872·0	441·67
Llangollen Countess†	J. T. Entwisle, Cambridge ..	2 10	241·5	305	6,379·9	436·73
Penrose Lady ..	J. B. Clemow, Stratford ..	1 324	240·5	305	7,899·8	434·06
Holly Oak Sparkle ..	F. Jennings, Mauriceville ..	1 334	240·5	305	6,791·0	430·32
Lady Ulma ..	C. G. Gibbons, Ngaere ..	1 309	240·5	305	7,098·2	429·64
Cloverlea May Morn ..	D. P. F. Malone, Kaponga	1 307	240·5	336	7,486·5	429·42
Ochone Mahone† ..	C. Stevens, Maungatapere ..	1 291	240·5	305	7,094·1	428·37
Maid of Virginia ..	F. V. Green, Midhirst ..	1 360	240·5	305	7,308·1	423·54
Penrose Cyclone ..	J. B. Clemow, Stratford ..	1 348	240·5	305	7,967·2	421·58
Silken Hose ..	B. N. and W. A. Sandilands, Feilding	2 18	242·3	305	8,039·9	420·63
Beechlands Promise ..	A. Moreland and Son, Te Rapa	2 13	241·8	313	6,920·4	413·00
Sultan's Ixia ..	D. A. B. Allison, Pukekohe	1 357	240·5	305	7,969·5	412·26
Besses Bright Princess	H. Stonex, Bell Block ..	1 363	240·5	342	6,592·9	410·25
Kolina	L. Kavanagh, Waihi, Hawera	2 8	241·3	305	7,821·3	409·95
Beaumont Hazel ..	C. J. Masters, Hunterville ..	2 29	243·4	316	8,125·1	409·70
Auroa Molly ..	J. C. Duff, Auroa ..	1 333	240·5	359	8,618·7	400·29
Ngahiwi Exile's Primrose	W. J. Freeth, Waitara ..	1 352	240·5	305	6,859·8	407·75
Agatha of Aria ..	M. V. Reeve-Smith, Aria ..	2 18	242·3	299	6,930·1	404·97
Miss Dudu ..	G. R. and H. Hutchinson, Auckland	1 334	240·5	304	7,020·1	402·08
Holly Oak Anella ..	T. H. Western, Bell Block ..	1 357	240·5	330	7,235·8	400·78
Tirvean Pride ..	R. W. B. Evans, Weraroa ..	2 15	242·0	365	7,144·5	400·04
Coniston Gold ..	R. Waterhouse, Ardmore ..	1 191	240·5	362	5,756·8	396·69
Roslyn Rona ..	A. J. Harris, Bombay ..	2 4	240·9	353	6,366·1	396·58
Penrose Flower ..	J. B. Clemow, Stratford ..	1 350	240·5	305	6,386·6	396·48
Klaver†	C. Stevens, Maungatapere ..	1 301	240·5	305	6,965·3	395·82
Jersey Meadows Princess	H. H. Phillips, Te Rehunga	2 5	241·0	305	6,921·7	391·24
Jersey Park Delight ..	W. H. Waterhouse, Runciman	2 6	241·1	303	6,995·6	389·28
Distinction's Duchess	W. P. Begg, Arapohue ..	2 24	242·9	364	7,010·6	386·46
Fanchette's Free ..	B. N. and W. A. Sandilands, Feilding	1 354	240·5	365	7,791·6	381·04
Wyndale Sunflower ..	A. O. Brown, Kamo ..	1 363	240·5	365	7,630·3	379·35
Omagh Beauty ..	R. K. Garland, Matamata ..	1 326	240·5	280	8,561·4	375·95
Marigold's Pet ..	D. A. B. Allison, Pukekohe	2 28	243·3	365	6,059·4	371·06
Darling Beauty ..	S. R. Lancaster, Palmerston North	2 2	240·7	356	6,706·9	370·62
Rosedale Brownwing	E. J. Adams, Puni ..	2 13	241·8	365	6,879·5	364·07
Patch's Iris ..	F. J. B. Ryburn, Paterangi	1 363	240·5	304	6,223·2	360·86
Awatea Belle ..	L. A. Lancaster, Palmerston North	2 14	241·9	329	6,102·0	357·76
Replete	J. Standen, Dalefield ..	1 359	240·5	297	7,020·3	352·75
Jersey Meadows Myrtle	H. H. Phillips, Te Rehunga	2 1	240·6	333	5,810·2	351·62
Ruby's Princess ..	L. Hall, Washdyke ..	1 226	240·5	365	5,594·2	346·33
Braeside Cloe ..	J. Mitchell, Hopelands ..	2 32	243·7	344	6,851·2	344·06

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Brookley Pet ..	W. Johnson, Ngaere ..	1 364	240·5	358	5,650·0	340·44
Kelvin Fancy ..	G. Buchanan, Paeroa ..	2 5	241·0	340	6,286·0	336·42
Awaroa Rona ..	G. Bright, Otaua ..	1 357	240·5	352	5,694·2	328·15
Mermaid's Queen ..	W. H. Waterhouse, Runciman	2 54	245·9	277	5,554·8	322·40
Tolgarth Oakless ..	J. Standen, Dalefield ..	2 5	241·0	294	5,708·9	321·19
Proud Duchess ..	G. Hodgson, Whakapara ..	1 325	240·5	299	6,099·9	318·28
Tongahoe Clematis ..	R. Hicks, Hawera ..	1 363	240·5	335	6,944·5	316·72
Eunice's Betty ..	J. H. Sherrard, Otaua ..	1 295	240·5	348	5,190·3	304·15
Glenavon Twin Pride	J. Townsend, Puni ..	2 7	241·2	365	5,199·3	302·38
Jersey Meadows Spright	H. H. Phillips, Te Rehunga	1 334	240·5	330	5,318·8	302·04
Glenavon Twin Joy ..	J. Townsend, Puni ..	2 8	241·3	365	5,369·2	296·01
Lyndon Daisy ..	R. J. Johnston, Runciman	1 269	240·5	328	5,562·6	290·94
Belvedere Dewberry ..	R. R. Dean, Te Kumi ..	2 50	245·5	300	5,510·7	290·57
Tongahoe Acorn ..	R. Hicks, Hawera ..	2 47	245·2	319	5,193·6	289·33
Tongahoe Dancer ..	R. Hicks, Hawera ..	2 12	241·7	314	5,763·9	281·15
Omagh Favourite ..	R. K. Garland, Matamata ..	1 329	240·5	245	6,157·8	280·59
Gowanbrae Olga ..	E. M. Peffers, Feilding ..	2 19	242·4	191	5,387·8	278·83
Persienne	J. H. Bentley and Sons, Kaponga	2 9	241·4	291	4,691·9	271·74
Royton Alice ..	H. Moreland, Newstead ..	1 358	240·5	343	5,299·0	266·39
Senora Patricia ..	F. E. Ford, Maungaturoto ..	1 333	240·5	271	3,831·9	262·49
Hillview Fantastic ..	Hunter Bros., Te Kowhai ..	1 335	240·5	209	4,862·4	242·52
Fencourt Fairy ..	R. Wattam, Cambridge ..	1 348	240·5	330	4,458·8	241·33
Senior Two-year-old.						
Marshland's Briar Eminent†	W. J. Chynoweth, Pukeroro	2 354	275·9	365	10,189·5	599·79
Jersey Lea Tea Rose	S. Bowker, Ihakara ..	2 362	276·7	365	9,410·0	558·14
Mauriaena Lurline ..	A. S. Lindsay, Whatawhata	2 279	268·4	365	9,664·0	541·09
Bilberry's Keepsake ..	W. Pollock, Hawera ..	2 276	268·1	347	9,462·5	537·91
Mary's Fancy's Sweet	J. R. Colson, Waihou ..	2 336	274·1	365	8,771·8	527·39
Ivry Rosalie ..	H. W. Le Bailly, Buckland	2 339	274·4	365	7,743·6	521·32
Foxglove's Pet ..	J. R. Colson, Waihou ..	2 340	274·5	349	10,308·0	499·99
Penrose Lass ..	J. B. Clemow, Stratford ..	2 363	276·8	365	8,675·8	498·25
Genteel's Neta ..	J. R. Colson, Waihou ..	2 313	271·8	365	7,846·8	486·52
Pukaki Rose ..	W. Robinson, Patumahoe ..	2 252	265·7	342	8,380·9	483·59
Cloverlea Snowdrop ..	D. P. F. Malone, Kaponga	2 330	273·5	363	8,100·4	460·26
Jersey Oaks Highland Mary	G. Milligan, Maungatereteretere	2 317	272·2	344	6,024·1	442·12
Fancy Fair	J. R. Colson, Waihou ..	2 356	276·1	340	8,878·8	422·01
Heatherlea Sunbeam	H. J. Lancaster, Levin ..	2 271	267·6	365	7,449·5	418·93
Picquette's Pansy ..	J. R. Colson, Waihou ..	2 308	271·3	359	7,227·8	386·29
Ebor's Cissie ..	R. J. Wilson, Putaruru ..	2 350	275·5	302	7,055·1	373·39
Exile's Morelle ..	R. Waterhouse, Papakura ..	2 337	274·2	355	6,078·5	367·71
Glory Bright ..	H. E. Walters, Waitoa ..	2 283	268·8	325	5,966·0	357·04
Gowanbrae Yankee Lass	E. M. Peffers, Fielding ..	2 342	274·7	201	7,039·5	308·73
Three-year-old.						
Round Bush Holly† ..	W. T. Williams, Pukehou ..	3 332	310·2	365	10,352·8	680·68
Jersey Brae Royalty	W. Robinson, Patumahoe ..	3 364	313·4	365	8,423·0	633·04
Oak Farm Actress ..	G. B. Knowles, Tariki ..	3 353	312·3	365	10,660·7	625·08
Rambler Rose ..	P. A. Anderson, Levin ..	3 345	311·5	365	11,391·5	623·35
Queen's Dark Lady ..	R. Waterhouse, Papakura ..	3 269	303·9	365	9,046·2	591·45
Ebor's Fanny ..	R. J. Wilson, Putaruru ..	3 307	307·7	340	9,246·5	588·88
Awatane Betsy ..	C. J. Masters, Hunterville ..	3 352	312·2	358	11,854·5	579·59
Vertex	A. S. Lindsay, Whatawhata	3 344	311·4	365	9,863·6	573·63
Queen Marjorie's Maid†	R. S. Tuck, Waharoa ..	3 0	277·0	365	9,254·0	557·06

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Three-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Belvedere Golden Pride	R. Wattam, Cambridge ..	3 93	286·3	365	8,785·4	543·93
Rosedale Redwing ..	E. J. Adams, Puni ..	3 268	303·8	342	10,624·6	542·29
Cherry's Model ..	J. R. Colson, Waihou ..	3 312	308·2	365	8,356·0	529·85
Golden Forest Flower	J. Robinson and Sons, Otaki	3 339	310·9	365	9,556·9	519·71
Jersey Brae Briar Rose	A. O. Brown, Kamo ..	3 356	312·6	365	10,043·6	511·84
Ratanui Tres Bon ..	J. Robb, Westmere ..	3 342	311·2	365	11,281·6	507·57
Woodland's Pansy ..	F. V. Green, Midhirst ..	3 246	301·6	365	8,160·6	506·37
Signor's Fancy ..	G. Buchanan, Paeroa ..	3 316	308·6	344	8,828·9	503·10
Engdale Cowslip .	A. S. Lindsay, Whatawhata	3 313	308·3	365	8,160·5	499·53
Imperial's Fascination	G. Buchanan, Paeroa ..	3 170	294·0	345	9,273·8	488·40
Viola's Golden Lady	M. V. Reeve-Smith, Aria ..	3 9	277·9	283	8,396·2	477·23
Miro Meadows Carnation	A. A. Ward, Tariki ..	3 318	308·8	365	9,009·3	474·04
Sedgemoor Rose ..	Miss E. J. Miller, Pirongia	3 56	282·6	343	8,087·9	453·45
Rosy Creek Life ..	C. P. Crowley, Kaponga ..	3 16	278·6	365	8,870·7	453·26
Tirohia Silver Fir ..	A. E. Peppercorn, Cambridge	3 353	312·3	359	9,621·6	442·63
St. Brigid	F. I. Washbourn, Timaru ..	3 232	300·2	365	8,921·9	440·89
Elf's La Primevere ..	J. Robb, Westmere ..	3 27	279·7	365	6,800·0	436·15
Ebor's Rose ..	R. J. Wilson, Putaruru ..	3 328	309·8	312	8,131·1	431·64
Thornycroft Queen ..	S. J. Bennett, Kaupokonui	3 290	306·0	365	7,787·5	418·60
Barnaigh Princess ..	W. T. S. Wilson, Otahuhu ..	3 239	300·9	365	6,802·4	413·26
Fair View Meadow ..	A. Hazelton, Waihou ..	3 361	313·1	286	7,746·5	393·71
Silverdale Butterfly ..	G. Hodgson, Whakapara ..	3 268	303·8	323	7,536·8	385·24
Silverdale Pansy ..	H. Doel, Taumarere ..	3 105	287·5	326	6,677·3	370·78
Jersey Lea Pride's Pet	S. Bowker, Ihakara ..	3 362	313·2	279	6,865·7	363·07
Ratanui Delight ..	W. E. Pilcher, Raumati ..	3 361	313·1	365	7,930·3	358·23
Pine Grove Lass ..	J. Luke, Whakatiri ..	3 15	278·5	265	6,532·7	356·32
Earlston Ruby ..	Chisholm Bros., Hunterville	3 42	281·2	299	6,298·3	344·61
Hawkesbury Caroline	W. E. Pilcher, Raumati ..	3 324	309·4	365	6,539·1	323·31

TRETHELLA SUNLIGHT (J. D. BROWN, WERAROA).

C.O.R., 1924, in Jersey three-year-old class: 13,726·4 lb. milk, 733·29 lb. butterfat.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Four-year-old.		Yrs. dys.	lb.		lb.	lb.
Oak Farm Magic Wand	G. B. Knowles, Tariki ..	4 341	347·6	365	11,681·6	653·94
Gowanbrae Daisy ..	R. W. B. Evans, Weraroa ..	4 18	315·3	365	11,346·1	625·67
Holly Oak's Primrose	G. R. and H. Hutchinson, Auckland	4 129	326·4	354	10,891·6	607·67
Meadowvale Black Pearl	O'Sullivan and Sons, Tariki	4 349	348·4	350	11,003·3	601·89
Admiral's Belle ..	E. Joyce, Kaponga ..	4 6	314·1	365	9,832·3	598·92
Patch's Maori Girl ..	E. Joyce, Kaponga ..	4 48	318·3	365	9,255·0	592·11
Sedge	R. R. Dean, Te Kumi ..	4 345	348·0	365	10,415·3	583·93
St. Aubin's Mignonette	H. Peoples, Drury ..	4 262	339·7	365	10,683·3	581·07
Holly Oak's Alma ..	W. P. Begg, Arapohue ..	4 111	344·6	365	8,532·4	579·13
Faith	P. McNaughton, Morrinsville	4 4	313·9	365	10,426·5	562·00
Violet's Gem ..	G. Hodgson, Whakapara ..	4 277	341·2	345	9,533·5	537·14
Glenlivet Daydream ..	W. H. Tippins, Opunake ..	4 72	320·7	365	9,427·3	528·12
Oak Farm Beauty Spot	G. B. Knowles, Tariki ..	4 13	314·8	360	9,531·5	483·18
Silverdale Bella ..	G. Hodgson, Whakapara ..	4 62	319·7	357	10,198·3	478·07
Springbank Ringlet ..	E. S. Holdaway, Ballance ..	4 362	349·7	354	8,970·1	457·04
Mayfield's Garnet† ..	W. J. Chynoweth, Pukeroro	4 41	317·6	365	9,049·1	446·29
Noble Fern Leaf ..	G. Hodgson, Whakapara ..	4 5	314·9	342	8,520·9	433·09
Woodstock's Fay ..	Miss E. J. Miller, Pirongia	4 355	349·0	359	8,063·1	398·97
Mauriaena Cleopatra	O. Glynn, Morrinsville ..	4 22	315·7	325	7,208·3	387·38
Fairy's Butter Maid ..	W. E. Pilcher, Raumati ..	4 36	317·1	365	6·721·9	382·11
Alfalfa Marjorie ..	J. K. Watson, Tatuanui ..	4 47	318·2	300	7,534·5	364·80
Mature.						
Dianella	R. R. Dean, Te Kumi ..	5 51	350·0	365	14,841·4	825·42
Bettie's Silver Leaf ..	G. B. Knowles, Tariki ..	5 325	350·0	365	15,114·2	722·52
Goneril†	C. G. Gibbons, Ngaere ..	6 7	350·0	344	12,712·3	718·46
Ivy of O.K. ..	J. V. Mortensen, Piopio ..	7 313	350·0	365	10,030·2	692·78
Miro Meadows Topsy	A. A. Ward, Tariki ..	6 332	350·0	333	12,437·8	682·74
Letta's Twylish ..	J. Murray, Woodville ..	5 317	350·0	351	14,094·5	673·45
Avoca's Queenie ..	W. H. Tippins, Opunake ..	7 362	350·0	365	12,938·4	652·55
Roslyn Sweet Lady Rose	E. J. Adams, Puni ..	5 362	350·0	365	10,733·9	652·12
Bay View Lass ..	J. Nicolson, Hawera ..	7 333	350·0	362	10,229·5	625·01
Golden Rose Glory ..	W. T. S. Wilson, Otahuhu ..	7 18	350·0	365	11,308·4	618·39
Sea Maid	S. Bowker, Ihakara ..	6 31	350·0	365	10,245·7	603·81
Pierette	J. J. Goodwin, Morrinsville	5 245	350·0	358	9,845·4	600·32
Twylish's Lily ..	H. W. Beatson, Aorangi ..	6 347	350·0	365	10,366·8	595·92
Aberbrothock's Flo ..	W. P. Begg, Arapohue ..	8 3	350·0	357	11,142·0	594·52
Hillcrest's Lovelight ..	H. Hall, Kimbolton ..	5 84	350·0	332	9,977·5	592·32
Connie Brighteyes	E. S. Holdaway, Ballance ..	5 343	350·0	361	9,782·9	591·04
Vaudeville	G. B. Knowles, Tariki ..	6 361	350·0	365	10,352·6	571·19
Ada's Maid† ..	W. J. Chynoweth, Pukeroro	11 44	350·0	357	10,327·8	570·15
Jewel Chimes ..	G. Hodgson, Whakapara ..	9 363	350·0	345	8,664·1	559·80
Parisian Diamond ..	P. A. Anderson, Levin ..	7 358	350·0	365	9,267·4	547·27
Ivy Bells	W. Johnson, Ngaere ..	9 4	350·0	345	10,113·8	546·34
Te Aroha Flower ..	J. A. Dearlove, Te Aroha ..	6 21	350·0	341	10,524·7	545·08
Fern Grove Xmas Gift	C. J. Masters, Hunterville ..	8 239	350·0	315	9,896·7	540·87
Dairy Girl	F. V. Green, Midhirst ..	7 306	350·0	365	8,793·9	529·69
Holly Oak's Lala ..	F. Jennings, Mauriceville ..	5 99	350·0	292	9,666·5	526·23
Larkspur	H. Peoples, Drury ..	9 10	350·0	365	9,648·1	526·19
Aberbrothock's Maggie	D. Marra, Dargaville ..	7 359	350·0	365	10,389·3	523·35
Darkie's Promise ..	Brakenridge and Pearson, Taupaki	5 172	350·0	365	9,576·2	520·70
Fairview Ruby ..	R. R. Dean, Te Kumi ..	5 43	350·0	355	10,272·3	517·25

LIST OF RECORDS—*continued.*

Name of Cow and Class	Tested by	Age at Start of Test	Fat req'd for Cert.	Yield for Season. Days	Milk	Fat.
				JERSEYS—*continued.*		
Mature—continued.		Yrs. d.	lb.		lb.	lb.
Foxbane	W. S. Carter, Palmerston N.	5 270	350·0	305	10,556·9	515·01
Silver Birch ..	W. S. Carter, Palmerston N.	7 292	350·0	35..	9,572·3	515·09
Engari	E. O'Sullivan and Sons, Tariki	6 340	350·0	355	10,596·5	509·46
Meadowvale Peg o' My Heart	E. O'Sullivan and Sons, Tariki	5 340	350·0	304	10,001·4	505·89
Fairy Frolic ..	E. T. Burke, Otakeho ..	6 335	350·0	305	10 580·4	503·79
Morva	J. H. Bentley and Sons, Kaponga	5 357	350·0	305	9 151·7	496·49
Tahua Orange Blossom	J. I. Fox, Aorangi ..	7 342	350·0	261	9,252·2	489·74
Fanchette	B. N. and W. A. Sandilands, Feilding	6 205	350·0	357	7 [illegible]·7	486·58
Willowbank's Surety	T. Ranford, Palmerston North	7 10	350·0	305	8 011·3	488·03
Bonny Girl.. ..	F. V. Green, Midhirst ..	6 249	350·0	305	7 947·6	485·55
Bilberry's Gem ..	W. Pollock, Hawera ..	7 304	350·0	316	8,707·6	485·50
Flower's Joy ..	D. L. A. Astbury, Mangatoki	7 301	350·0	332	9 510·7	484·68
Uranium	A. Hazelton, Waihou ..	7 21	350·0	334	7 518·8	482·75
Hillcrest's Orange Blossom	J. A. Dearlove, Te Aroha ..	8 34.	350·0	305	9 [illegible]·1	476·00
Fernaig Blossom ..	H. W. Le Bailly, Buckland	6 262	350·0	305	8,200·1	467·23
Wai Whenua Carissima	R. J. Wilson, Putaruru ..	7 168	350·0	315	8,522·5	467·22
Noble Fern ..	C. Stevens, Maungatapere ..	5 251	350·0	303	7,727·8	465·74
Star's Dairymaid ..	G. B. Hull, Wellington ..	7 30.	350·0	33.	9 [illegible]·4	464·98
Moss Rose	L. A. Lancaster, Palmerston North	5 350	350·0	304	9,258·3	461·16
Mosul ..	C. Stevens, Maungatapere ..	6 8	350·0	330	7 962·2	460·70
Waireka	H. J. Lancaster, Levin ..	12 20	350·0	336	9,916·9	458·54
Silverdale Nell ..	G. Hodgson, Whakapara ..	5 5	350·0	347	9,512·6	450·45
Waimarie ..	W. Pollock, Hawera ..	8 354	350·0	320	8,100·4	448·41
Springfield Betty ..	H. Peoples, Drury ..	8 288	350·0	31.	7,709·7	447·47
Butter Lady ..	W. E. Pilcher, Raumati ..	11 305	350·0	305	8,280·7	441·47
Silverdale Prim ..	G. Hodgson, Whakapara ..	5 101	350·0	334	8,066·3	440·27
Tikorangi Golden Bell	J. Cloke, Lepperton ..	6 292	350·0	315	7,468·1	439·29
Pet's Pride ..	H. R. Snell, Ngunguru ..	7 215	350·0	305	7 319·1	423·80
Springbank Dot ..	E. S. Holdaway, Ballance ..	7 41	350·0	352	7 857·7	423·02
Butter Lady's Creamy	W. E. Pilcher, Raumati ..	6 232	350·0	304	7,250·5	423·01
Lily's Zealandia ..	A. Hazelton, Waihou ..	6 300	350·0	283	8,160·3	418·45
Mystery Lass ..	W. H. Waterhouse, Runciman	8 355	350·0	257	7,200·1	415·60
Brooklyn's Caramel ..	H. J. Lancaster, Glen Oroua	6 23	350·0	330	8 714·5	414·37
Miro's Lass ..	J. Poletti, Bell Block ..	5 303	350·0	33.	9,458·5	411·34
Optician's Prim's Rose	W. E. Pilcher, Raumati ..	8 305	350·0	300	7,100·0	407·52
Pocahonta's Peggy ..	J. Klenner, Kaimata ..	6 318	350·0	350	5,966·6	406·93
Silverdale Duchess ..	G. Hodgson, Whakapara ..	5 321	350·0	325	7,278·8	402·78
Melia's Ann's Beauty	R. W. B. Evans, Weraroa ..	11 304	350·0	316	7,079·3	400·03
Besses Passion Flower	G. R. and H. Hutchinson, Auckland	5 34[illegible]	350·0	344	7,200·6	395·06
Lady Lucerne ..	R. K. Garland, Matamata ..	8 110	350·0	298	7,406·5	392·81
Rewarder's Dot ..	A. Hazelton, Waihou ..	6 27	350·0	259	6,902·4	372·24
Renona	R. K. Garland, Matamata ..	7 274	350·0	357	6,750·1	350·84
				FRIESIANS.		
Junior Two-year-old.						
Waverley Maid* ..	T. R. Eades, Edendale ..	2 103	250·8	365	18,430·6	587·58
Cornucopia Pontiac Paxton†	Hodgson Estate, Tamahere	2 152	255·7	364	18,570·7	563·70

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
FRIESIANS —*continued.*						
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Brookside Pietje Johanna†	Cameron Bros., Stratford ..	1 327	240·5	338	15,525·3	540·25
Pauline Pietertje Alcartra*	J. E. O'Shea, Ohangai ..	1 358	240·5	365	14,940·2	537·12
Bywell Daisy Paxton†	T. H. Richards, Cardiff ..	2 65	247·0	365	14,186·0	520·03
Lady Johanna Paul Pontiac*	John Court, Ltd., Auckland	2 96	250·1	365	12,824·7	505·78
Belle of Dominos* ..	W. I. Lovelock, Palmerston North	2 94	249·9	365	12,097·4	448·68
Glenmore Nazli Domino†	D. H. Johnson, Stratford ..	1 319	240·5	362	10,179·4	383·42
Dominion Mutual Mercedes Beets	Central Development Farm, Weraroa	1 298	240·5	364	10,660·9	380·07
Dominion Colantha Beets	Central Development Farm, Weraroa	2 9	241·4	357	10,534·6	368·46
Dominion Countess de Kol	Central Development Farm, Weraroa	1 319	240·5	320	9,326·3	366·03
Kowhai Tip ..	W. A. Kyle, Palmerston N.	1 334	240·5	318	8,698·9	284·79
Anawhata Belle Pietertje Segis	P. F. Boucher, Kumeu ..	1 283	240·5	361	7,916·4	279·94
Lady Bonheur† ..	C. Boyce, Tatuanui ..	1 311	240·5	333	7,406·2	279·54
Senior Two-year-old.						
Cluny Pietje Kate 15†	Hodgson Estate, Tamahere	2 325	273·0	365	13,731·3	489·14
Oaklands Springhill 2nd*	John Court, Ltd., Auckland	2 324	272·9	334	11,821·9	473·36
Friens Mercedes Johanna†	D. Dickie, Wellington ..	2 186	259·1	365	11,672·2	433·76
Miller Chloe Segis Aaltje*	John Court, Ltd., Auckland	2 267	267·2	365	11,748·5	376·87
Grahamholm Lady May Ormsby*	John Court, Ltd., Auckland	2 223	262·8	334	9,325·4	334·39
Dominion Colantha Fayne	Central Development Farm, Weraroa	2 291	269·6	331	10,412·4	327·80
Junior Three-year-old.						
Roslyn Blanco Johanna Pontiac†	Waitemata Stud Farm, Auckland	3 70	284·0	329	9,698·3	393·32
Bonheur Lassie† ..	C. Boyce, Tatuanui ..	3 10	278·0	315	9,120·9	349·15
Senior Three-year-old.						
Pareora Domino Van Thumper*	A. S. Elworthy, Timaru ..	3 260	303·0	365	16,530·1	638·67
Sadie of Avonmore* ..	J. McAnulty, Ashburton ..	3 293	306·3	365	14,691·3	571·98
Coldstream Magpie Lassie	C. H. Silby, Aratapu ..	3 364	313·4	267	8,818·1	415·08
Junior Four-year-old.						
Bainfield Topsy 10th*	O. A. Cadwallader, Greytown	4 132	326·7	365	22,456·0	863·89
Senior Four-year-old.						
Pareora Snow† ..	A. S. Elworthy, Timaru ..	4 357	349·2	365	20,238·8	680·37
De Kol Pearl* ..	Matangi Friesian Farm Co., Matangi	4 310	344·5	300	12,607·5	481·84

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
FRIESIANS—*continued.*						
Mature.		Yrs. dys.	lb		lb.	lb.
Monavale Queen Bess*	T. H. Richards, Cardiff ..	5 329	350·0	333	25,598·0	950·90
Coldstream Magpie Domino*	G. A. Marchant and Sons, Cardiff	5 315	350·0	365	19,759·4	924·47
Zozo II of Ashlynn* ..	John Court, Ltd., Auckland	8 259	350·0	365	23,274·7	905·89
Janette Segis Oak* ..	John Court, Ltd., Auckland	7 179	350·0	365	25,573·8	787·63
Segis Grace Homestead*	Matangi Friesian Farm Co., Matangi	6 17	350·0	276	18,112·0	689·11
Friens Mercedes Aquila†	D. Dickie, Wellington ..	5 318	350·0	365	21,589·3	665·39
Waihi Milkmaid† ..	D. H. Johnson, Stratford ..	6 27	350·0	356	19,013·2	628·50
Segis Lady Waihi* ..	D. H. Johnson, Stratford ..	5 342	350·0	357	17,439·3	609·34
Queenette Pietertje* ..	Matangi Friesian Farm Co., Matangi	8 360	350·0	249	13,254·9	570·71
Coldstream Colantha Princess*	G. A. Marchant and Sons, Cardiff	5 261	350·0	286	15,890·3	519·25
Woodlands De Kol Lady*	John Court, Ltd., Auckland	9 174	350·0	365	15,081·8	498·87
Lady Royalist† ..	C. Boyce, Tatuanui ..	9 191	350·0	317	13,781·9	478·06
Peria Queen ..	J. H. Wilson, Matamata ..	5 340	350·0	317	11,819·5	460·84
Pontiac Jewel Aagie ..	J. H. Wilson, Matamata ..	11 180	350·0	311	13,235·8	457·30
Princess Mercena Pontiac*	John Court, Ltd., Auckland	5 299	350·0	365	13,973·0	452·40
Johanna Van Segis ..	W. A. Kyle, Palmerston N.	6 80	350·0	312	12,426·5	412·21
Pine Grove's Pride de Kol	E. J. Betts, Okaiawa ..	5 364	350·0	324	12,041·1	379·00
MILKING SHORTHORNS.						
Senior Two-year-old.						
Mereside Gem ..	W. Bowis, Doyleston ..	2 350	275·5	365	11,286·3	461·52
Senior Three-year-old.						
Eleam Minnie ..	Hanson Bros., Parakai ..	3 319	308·0	365	10,143·2	433·34
Mature.						
Kaitawa Mabel 2nd† ..	J. H. Mason, Feilding ..	7 318	350·0	353	16,115·4	569·77
Matangi Daphne's Darling*	Simms and Son., Ltd., Halswell	5 39	350·0	310	10,205·1	406·92
AYRSHIRES.						
Three-year-old.						
Prudence of Braeside	Robertson and Blackley, New Plymouth	3 346	311·6	318	10,474·7	389·03
Mature.						
Glencairn Brownie† ..	A. Montgomerie, Kauwhata	8 360	350·0	365	15,579·4	728·05
Glencairn Jenny Lee†	A. Montgomerie, Kauwhata	5 311	350·0	365	15,433·0	694·28
Second-class Certificates.						
Jerseys.						
Mature.						
Lucky Dorothy Cactus†	C. Stevens, Maungatapere ..	6 204	350·0	365	12,483·5	649·21
Silverdale Katherine	G. Hodgson, Whakapara ..	6 240	350·0	365	7,677·1	483·53
Friesians.						
Junior Two-year-old.						
Dutch Queen Segis*	W. I. Lovelock, Palmerston North	2 58	246·3	365	10,694·4	368·90

SEASONAL NOTES.

THE FARM.

HILLSIDE ENSILAGE-PITS.

WHERE suitable banks are to be had in handy positions the hillside pit is an excellent method for making ensilage, and frequently one can be provided in each field or made where it will suit two or three paddocks. In choosing the site for a hillside pit, care should be taken to see that it can be conveniently filled from above, and that a good road can be had from the front of the pit for carting out the material. A round pit is much better than a square one, as it is difficult to fill the corners satisfactorily in the latter so as to exclude the air, and there is often considerable loss from this cause. The walls should have a slight batter, 1 in 15 being about right. The opening to a round pit should, if possible, be just wide enough to allow a dray to back in, and where the pit is to be permanent the corners of the opening should be cemented so as to carry timber to close the opening as the stack is being filled. In the case of a temporary pit a good stout post may be placed at these corners, and timber for closing the opening should not be less than 2 in. stuff. In filling the pit, great care should be taken to see that it is evenly filled and that the sides are well tramped, so that there is no possible chance of the material shrinking from the walls and admitting air. The same precautions are necessary in filling a pit as in building a stack to see that the temperature is properly controlled. The following is the approximate holding-capacity of round pits or silos: 20 ft. by 10 ft., 30 tons; 20 ft. by 12 ft., 45 tons; 24 ft. by 12 ft., 55 tons; 20 ft. by 14 ft., 60 tons; 30 ft. by 12 ft., 75 tons; 30 ft. by 14 ft., 100 tons.

THE SWEDE CROP.

Where December sowing of swedes is practised the land should now be well cultivated in preparation. A fine, firm, moist seed-bed is required, and care should be taken that the seed is not buried, as frequently happens when the drill is set on a firm headland and then taken on to the softer cultivated soil. Local experience must be the guide in deciding the best time to sow. In general, the later the sowing is made the less danger will there be from dry-rot; but, on the other hand, if left too late dry weather may result in a poor strike. A suitable seeding is from 10 oz. to 14 oz. per acre through every second coulter, with from 2 cwt. to 3 cwt. of manure. Fertilizers should consist of quick-acting phosphate, in order to promote rapid growth during the early stages when the plants are subject to insect attack, and a slow-acting phosphate to carry on the growth well into the winter. Mixtures, depending on the soil and other conditions, of equal parts of superphosphate and of one or other of Ephos phosphate, basic slag, bonemeal, or Nauru rock phosphate have all given good results. On old land the addition of ½ cwt. sulphate of potash per acre will give in many cases good results. The seed and fertilizer should be mixed immediately before sowing, and not left to stand mixed.

SOFT TURNIPS.

Late sowings of soft turnips for feeding dairy stock may be made in December, and for autumn and early winter feeding the green-top varieties will generally be found best. Green Globe and Green-top Aberdeen are two good varieties, and sown towards the end of the month will keep well into the winter.

THINNING AND INTERCULTIVATION OF MANGOLDS.

Mangold crops should be thinned as early as possible in the coming month, so as to get rid of weeds between the plants and allow them to become well established before dry weather sets in. A thinning to 1 ft. apart will be found good practice generally. Wider thinning is often advised, but except on very good soils heavier and better crops are grown when the plants are close together. Yellow Globe varieties, however, may be thinned to 15 in. with advantage. Should the plants be pale in colour and showing poor leaf-formation at thinning-time a top-dressing of ½ cwt. to 1 cwt. of nitrate of soda will help to push them along, and often produces a considerable increase in the yield.

Intercultivation with the hand or horse hoe should be frequent and thorough during December and January. This cultivation has generally more effect on the resulting crop than the initial manuring. Even when free from weeds mangolds benefit to a marked extent by a frequent stirring of the soil between the rows. This operation promotes root-growth and prevents excessive evaporation of soil-moisture, which latter is generally in short supply during the summer. The soil should not be banked around the plants (especially with the Globe varieties), but rather drawn away from them, and the outside tines of the cultivating-implement should be set to do this.

CLOVER AND LUCERNE SEED.

Clover fields intended for seed have in many cases been badly trampled and puddled during the winter and spring. The cutting of white-clover crops in such fields, when the knife has to be placed very close to the ground, is apt to be exceedingly hard on the mower. With land in this condition it will be well to await a favourable opportunity for improvement. After there has been a fall of rain just sufficient to slightly soften the ground it may be possible to roll the surface down. Any attempt to roll on clay land when the ground is hard and scarred with hoof-marks will be time wasted. In the case of red-clover paddocks rolling will not be so necessary, as the mower-knife cuts higher above the ground.

Owing to the recent sharp rise in the price of lucerne-seed it is probable that a considerably larger area in Marlborough will be shut up for seed this season. On the lighter soils stands which have received the ordinary spring cultivation with the stiff drag cultivators and a winter top-dressing of superphosphate will, in the ordinary course, be hayed in November, then shut up, and cut again for seed about January or February. On the heavier soils, where the growth of stem and leaf is rank, it may be necessary to open the spaces between the plants by rigorous cultivation. To secure high yields of seed the access of light and air is essential. Great bulk of foliage is generally incompatible with high seed-yield.

SOME HAYMAKING HINTS.

In considering the hay crop it should always be remembered that quality is of greater importance than quantity. Often meadow hay is not cut until the grass-plants have gone to seed and the hay has lost much of its nutritive value. Quality passes away with maturity, and the highest quality can only be secured by mowing at the proper time —that is, when the predominant varieties of grasses are in flower.

Haystacks should always be built on a well-drained site, using a good bottom of old posts or hedge-brushings. The sides should be carried slightly outwards as building proceeds, and the heart of the stack kept well mounded up. A flat roof must be carefully avoided. Care should also be taken that those working on the stack do not stand for long at any one point, otherwise the roof will settle unevenly and wet places tend to form.

The horse-rake is often wrongly used. It is lightly built and easily strained, and, while it may be quite legitimately used for gathering the hay in to windrows, it should never be used for collecting large quantities into cocks or dumps. The sweep will pick up a windrow quite well if the horses move briskly, and it is as easy to load a dray from a windrow as from a dump.

With regard to special hay crops, it was noticed last season in a number of cases that oats and peas were allowed to approach the ripening stage before being cut. If best results are to be obtained from this crop a much earlier cutting must take place. The right time is when the peas are well in flower, and at that period the oats will also be at the right stage.

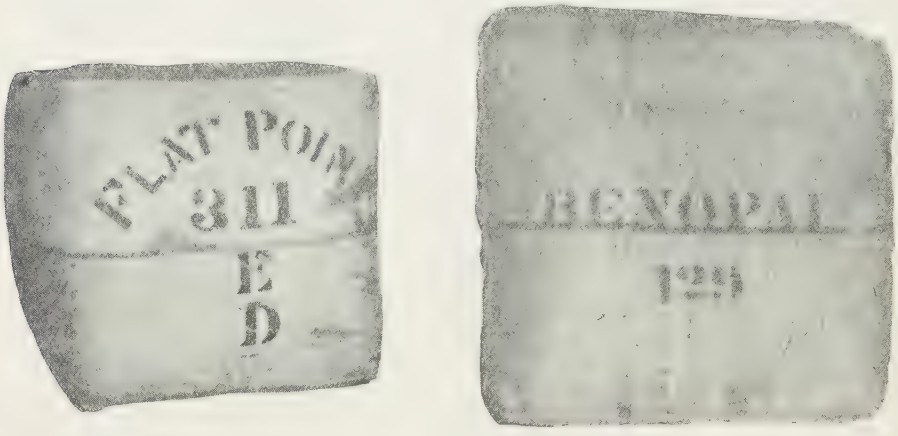
—*Fields Division.*

BRANDING, WEIGHING, AND BOOKING OF WOOL-BALES.

These matters — especially branding — require more attention by many sheepfarmers. The bale should be branded on both ends with the station or farm name and the number; the class of wool in the bale may also be branded if desired. Say it is A combing, Romney Marsh hogget: the letters A over RM over H will do; or if it is wethers, W will suffice. Brands should be stencilled in black ink, in upright block letters not less than 3 in. in height. Brands must consist of not less than three letters. Double marks, conjoined letters, or fancy signs which cannot readily be transcribed should be avoided. The bales should also be numbered consecutively with figures at least 3 in. in height.

The proper stencilling cake or powder should be used for branding. If a cake, knock off about one-quarter and break this into small pieces; put these into a tin receptacle and pour in boiling water, which will dissolve the pieces quickly. When cool, pour into a bottle, cork, and use the liquid as required, diluted with cold water if too thick. Into an enamel or tin plate put a small piece of wool; pour some of the liquid on this, and when branding the bale dip the brush into the plate (this ensures an even supply of the fluid) and rub the brush over the stencil-plate. If a station or farm has a private mark, put this on the bale first; the name of the station next in the middle; then the number of the bale underneath.

If scales are available it is best to have the bale weighed. Bales of wool should not weigh more than 4 cwt., as for over 4 cwt. the railage charges are higher; for over $4\frac{1}{2}$ cwt., charges for wharfage, dumping, handling, cartage, &c., are half rate extra, and for over 5 cwt. the charges are double.



WELL-BRANDED BALES.

Left: Bale with name of station, number, and description of wool. Right: Bale with name of station and number; this latter branding suffices and is recommended generally.

All bales as soon as they are branded and weighed should be duly entered in the wool-book, with the number of bale in left-hand column, description of wool in the bale in the wide column, and the weight in the three columns on the right. When sending the wool to market the numbers should be forwarded consecutively, for the convenience of the firm handling the clip. An invoice copied from the wool-book should also be supplied to the firm as each load leaves the shed.

—*J. G. Cook, Wool Instructor, Live-stock Division.*

THE ORCHARD.

HANDLING THE STONE-FRUIT CROP.

By the end of November growers will have a pretty good idea of the crop prospects for the season. Stone-fruits will be nearly ready for harvest, and cases will need to be secured and made up in readiness. In some localities second-hand cases are largely used, and growers should bear in mind that serious risks are entailed by this practice, owing to the fact that spores of brown-rot fungus are likely to be lodged in cracks and crevices, which attack the fruit in transit. Where these cases are used growers should take the precaution to treat the cases and lids with a solution of pure bluestone, 1 lb. to 20 gallons water, sufficiently in advance of packing to allow them to dry before using. Where railway fruit-trucks are in constant use the same treatment could be also applied with advantage.

In the marketing of stone-fruits the greatest care should be taken to ensure the fruit arriving on the market in the best condition. A slightly hard fruit may be worth something, but rotten fruit is a loss to all concerned. At the same time one should refrain from picking immature fruit. Size and pack the fruit well, and market specially selected samples in trays where this is convenient. There are outlets for all grades, and they should be kept separate for the purpose of diverting them into the proper channels.

ATTENTION TO PIP-FRUITS.

Now is the time for growers to think ahead. It may appear premature to talk of grading for export, but now is the time to start. Where the crop is a good one, thinning will be the important work. Unless one is very lucky there will be some black-spotted fruit to get rid of, and this is best done now. Do not thin indiscriminately; discard the worthless fruit, irrespective of its position on the tree. The lighter-loaded trees are a more difficult problem, and in this case one cannot afford to thin too heavily owing to the difficulty of forcing greater size into the remainder. But the object should be to produce only fruit fit for export grades, and if this were accomplished our local-market problems would be half solved.

SPRAYING.

Much will depend on the developing foliage and crop as to what spraying will now be required for the control of fungus diseases. Should the weather still be unsettled, stone-fruit trees will continue to need attention for brown-rot. Lime-sulphur, 1–125, or 8–8–50 self-boiled, though it may not be a perfect cure, has certainly been proved helpful in minimizing the loss. Black Leaf 40, at 1–1,000, should be added for green aphis if this pest is troublesome.

Apple and pear trees should still receive attention for black-spot and mildew, and the condition of the trees combined with the amount of infection should be the deciding factor as to what strengths of lime-sulphur or sulphur pastes should be used. Growers should obtain the advice of the Orchard Instructor for the district if in doubt as to what course to adopt. Even though fungus diseases may not be in evidence, spraying must be continued for insect pests. Red-mite soon gets out of hand if lime-sulphur is discontinued. Arsenate of lead must be renewed on the trees every fourteen to twenty-one days, according to the weather experienced, if best results are to be obtained against codlin-moth and leaf-roller caterpillar. If leaf-hopper is in evidence Black Leaf 40 should be combined with other materials to secure the best results.

CULTIVATION AND MANURING.

Cultivation should be continued during December, and the green crop grown in good time, especially if blue lupin is to be the crop. Heavily laden trees and trees making poor growth will be benefited by the application of nitrate of soda or sulphate of ammonia during December, at the rate of 1 lb. to 2 lb. per tree according to condition.

—J. H. Thorp, Orchard Instructor, Nelson.

CITRUS-CULTURE.

The most important seasonal work in the citrus-grove at this period is spraying. The very unsettled weather prior to flowering precluded in many instances the application of insecticidal sprays, and in most cases lessened the effect of those applied. The young of black scale, mites, and thrip are now active; a spraying of insecticide is therefore required to destroy these and prevent extensive infection. In many groves oil-spraying in winter to early spring is practised, followed by an autumn application. This proves insufficient to give thorough control, and results in a dirty crop, apart from the damage to the tree. Summer insecticides are required for a thorough job. Oil at 1–60, applied alone, or Black Leaf 40 at 1-800, applied with soap or with bordeaux, gives satisfactory results, while lime-sulphur at 1–50 is not quite so good or effective. Oil, 1–60, plus 4–4–40 bordeaux, is so far giving good results, and should be tried in a limited way by those interested. With the fall of the bloom, sprays for verrucosis and grey scab will be advisable. Bordeaux, 4–4–40, should be applied, and repeated at twenty-one-day intervals until the fruit is well grown.

Cultivation should be well maintained, the soil being worked sufficiently to ensure a good tilth, particularly of the top 3 in.

—W. H. Rice, Orchard Instructor, Auckland.

POULTRY-KEEPING.

CARE OF GROWING STOCK.

Now that many chickens are half-grown it is well to reiterate that if they are to develop into really profitable stock they must not be neglected in any way. In the first place, good and liberal feeding is imperative, included among which should be an abundance of green food.

Before the young birds are removed from the brooder to the colony house, and especially where adult stock have been previously kept, the whole of the interior of the quarters should be thoroughly cleaned and disinfected as a prevention against parasitic life. One of the strongest points in favour of an incubator is that it does not breed vermin—a source of probably the greatest leakage at the present time in connection with poultry-keeping. It is true that chickens will do well to a greater or lesser extent when with the natural mother, even when infested with vermin, but vermin are practically fatal to the artificially produced chicken.

Another important point in the management of growing stock is to keep the different ages and sexes as distinct as possible, so that the treatment may harmonize with the stage of development of the different-aged birds. On many plants there is altogether too little classification of stock. The best results will never be secured unless the chickens of different ages are penned separately, and the treatment of each pen is in uniformity with the special demands of the particular occupants. When chickens are first drafted from the brooder to the colony house the sleeping portion should be more or less secluded—in other words, similar in all respects to the brooder conditions they have

been removed from. In this way they will be induced to settle down, and the risk of huddling in corners thereby minimized. Perches about 1 ft. from the ground with some grain-sacks placed over them will usually have the effect of preventing huddling. Of course, the sacks should be arranged in such a way that plenty of fresh air is available to the birds at all times. The risk of losses through huddling and its evil effects will also be greatly lessened by rounding the corners of the house with wire netting.

It is a mistake to confine half-grown chickens in a small run or to curtail exercising-space in any way, as this is one of the most common causes of leg-weakness and other troubles. Plenty of exercise is specially necessary for the growing bird to keep it in a healthy, thriving condition. Another requirement is clean ground or a run that has been spelled for some considerable time. A stale run, especially where adult stock have recently had access, is responsible for much of the weedy stock and layers of small eggs, which are becoming far too common. No care or attention is too good for the growing pullet, from which so much will be expected at a later date in egg-production. It must not be forgotten that if a chicken once receives a setback it may never recover.

Good shade, grit, dusting-places, and shelter from wind are also among the requirements for the maintenance of good health in the developing bird.

PURE-BREEDING AND CROSS-BREEDING: CAUTION NECESSARY.

The egg-laying competitions have taught farmers many lessons in regard to the management of poultry, and probably the most important lesson yet conveyed is the great superiority of purebred stock as compared with crossbred or barnyard fowls. Previous to the advent of these competitions the great majority of the fowls kept on the farms were of a crossbred class, and it was generally admitted that they did little more than pay for the food they consumed. Farmers generally preferred the crossbred or barnyard bird for ordinary purposes, rather than what was then considered an ideal show specimen. The reason the show bird was considered unsatisfactory for egg-laying purposes was chiefly due to the judges favouring fancy abnormalities and ignoring points indicative of vitality and egg-laying capacity.

While this is true, the fact should not be forgotten that the greatly increased egg-production that has taken place during recent years could never have been achieved had it not been for the work performed by the fancier, who by careful selection and a love for his work made and brought to perfection the beautiful breeds of poultry we have at our command to-day. The fancier, in fixing types and characters of the various breeds, undoubtedly performed a great work, and still deserves the credit of laying the foundation of all the heavy-producing stock now available. Obviously the making of a breed and bringing it to perfection is of much greater importance than merely improving it from an egg-producing viewpoint. It is recognized by all who have concerned themselves in animal-breeding that it is only the type which has been bred true to a given standard from generation to generation that has the power of transmitting desired character. It is gratifying to know that the great majority of farmers are showing their appreciation of this principle by keeping nothing but pure breeds

of poultry. There are now few farms where purebred birds are not kept—that is, birds of laying-type combined with egg-productive power and the desired characteristics of the breed they represent.

Farmers in particular would be well advised not to depart from this policy for any other that may be advocated, until at any rate some sound proof is forthcoming of the advantages to be gained. For example, it has been proved by crossing certain breeds of poultry that the sex of the progeny produced from such unions can be ascertained at the time they are hatched. It is claimed that such crossbred stock have a decided advantage from a profit-making viewpoint as compared with progeny produced from a fixed purebred type. The reason for this is, firstly, that no crossbred males need be reared; secondly, because the space they would otherwise take up could be occupied by laying-birds; while it is further claimed that the crossbred pullets are easier to rear and will lay larger eggs and more of them than purebred stock. These claims are all very well in their way, but the fact remains that cross-breeding is nothing more or less than haphazard breeding for the production of any character. As a means of increasing egg-productive capacity it is certainly a "hit or miss" system of breeding as compared with the breeding of purebreds.

It is true that a first cross will often produce a phenomenal egg-yield, but it is generally conceded that the progeny from such a cross when bred from will prove disappointing. Under the new order of things advocated the farmer or poultry-keeper would have three issues in his breeding operations for consideration—the maintenance of two purebred flocks (for it takes two purebreds to produce a first cross), and in addition a third mating for the production of the crossbred stock. Farmers in general would be well advised to keep one pure self-coloured breed of fowls—black or white. In this way the flock will not only present an attractive uniform appearance, but the trouble of mating and classification of stock will be reduced to a minimum as compared with the keeping of two or more breeds, especially where crossing breeds is resorted to.

I would again emphasize that before discarding proved methods of breeding for the adoption of any new and partially tried method the poultry-keeper (the farmer in particular) should carefully weigh the matter well over in the light of common-sense, especially that phase which aims at the production and distribution of crossbred stock throughout the community.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

REQUEENING.

By this time the beekeeper should be able to decide which of his queens are fit to carry on through the season, and which should be destroyed and replaced by new ones. During the swarming season it is a simple matter to obtain good ripe queen-cells for requeening purposes. A few nucleus hives are a valuable asset in any apiary, and may be utilized throughout the summer for the purpose of hatching and mating relays of young queens. In addition to the employment

of queen-cells produced under the swarming impulse (and such cells are usually of the best quality) there are several methods of artificial queen-raising in practice among commercial beekeepers. Most of these are described in any text-book, but are sometimes regarded as too intricate for the average man.

A simple method, and one frequently very successful if only a small number of cells is required at once, consists in raising several frames of eggs and very young brood above an excluder, confining the queen to the bottom story. At the end of ten days or so there should be several good queen-cells on the frames above the excluder ready to transfer to nucleus colonies. These cells should be carefully cut from the combs without any jarring or shaking, and grafted on to combs in the nucleus hives. On no account should the queen-cells be removed before the tenth day. They would really be better left in the parent hive for a longer period, except for the fact that the bees may have raised them from young larvæ, in which case they will be due to hatch on the eleventh or twelfth day. This method is even more likely to ensure success if the combs containing eggs, &c., are placed in the third story with a super of sheets of foundation or empty combs between them and the brood-chamber. In this case, also, the excluder should be placed on top of the brood-chamber. It must be borne in mind that no dequeening is required by this method.

Another simple method, and one more easily controlled by the beekeeper, consists in placing a frame of eggs horizontally over the frames in the brood-chamber. This is best arranged for by placing an empty worker-comb in a strong colony and marking the date on the frame. As soon as the queen has laid in the comb the colony which is to be utilized for queen-raising purposes must be dequeened, and it is best at the time to remove all unsealed brood. This will ensure that all queen-cells will be raised on the specially prepared frame of eggs. If every second and third row of cells is pared down to the midrib, and only one in four of the cells in the remaining rows allowed to contain an egg, a greater number of queen-cells will probably be procured. However, the frame will usually be found quite satisfactory just as it comes from the hive without any paring or cutting. An empty frame must be procured and laid on top of the brood-chamber. On this the frame of eggs is laid, and the whole covered with two or three mats. An empty super must be placed on the hive so that the frame of eggs will not be crushed when the roof is put on. The bees will draw the queen-cells downward, the empty frame allowing room for them to be developed to their full length. If only eggs are used, as suggested, the queen-cells may be safely left on the hives for thirteen or fourteen days after the introduction of the frame of eggs, by which time they will be ready for the nuclei. As soon as the young queens in the nuclei have laid a fair number of eggs they should be removed to replace a failing queen, and their places filled by more ripe queen-cells, until a sufficient number of young queens have been produced to renew the stocks in the apiary.

TREATMENT OF FOUL-BROOD.

As advised in the September issue notes, beekeepers should undertake treatment of diseased colonies as soon as weather conditions permit. All infected stocks should be dealt with so that they may

build up in time to work the main crop. Usually at the end of November the weather is settled enough in all parts of the Dominion to carry out treatment, and in many districts the clover is yielding sufficiently to enable the beekeeper to treat successfully with a minimum amount of feeding. Poor honey crops are almost invariably the result of neglected and diseased stocks, and many beekeepers are apt to blame seasons instead of seeking the enemy within the hives. There is no gainsaying the fact that foul-brood is destructive of more colonies than starvation, and in too many cases the beekeeper is apt to treat the disease as of little consequence, only to wake up later on and find that it has decimated his stocks and reduced his returns to nil. For full particulars as to treatment see the Department's Bulletin No. 119, "American Foul-brood in Bees and its Treatment."

WAX-MOTH.

From time to time advice is asked as to the eradication of this insect pest. Usually these moths are the enemies of the careless beekeeper and those who have not advanced beyond the box-hive stage. It is the larvæ or grubs which prove so destructive to the combs, burrowing through them under the protection of the silken galleries which they spin round themselves. Eventually the combs are destroyed and fall a mass of cocoons to the bottom of the hive. No better advice can be given for coping with these insect enemies than to keep all colonies strong and to Italianize the apiary. Italians are better able to contend with the pest than blacks. All old and failing black queens should be replaced with vigorous young Italians.

PREPARING FOR THE HARVEST.

Although extracting is still a few weeks ahead in most districts, the honey-house and appliances should be put into proper condition for dealing with the main flow. Any repairs necessary should be undertaken at once, all utensils scoured and sterilized, machinery oiled and overhauled, and, in fact, the whole outfit "spring-cleaned," so that operations may be commenced at short notice. Half the drudgery of extracting may be obviated by complete preparedness for the most important work of the season.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

SMALL-FRUITS.

Growers of berry fruits will now be busy harvesting their crops. The gooseberry and strawberry picking will be well under way, and the current and raspberry harvest about to commence. These facts might well be given more publicity by growers' associations. Very few people are aware of the brief period during which these popular berries are available. Were the people acquainted with the facts and a fresh supply made readily available, the consumption would increase greatly. To enable the berries to be supplied in the best condition picking must commence early in the day and the fruit consigned that afternoon. A reasonably even sample should be maintained, both as to maturity and size.

Cape gooseberries and passion-vines should receive regular cultivation at a moderate depth only, in order to maintain a soil mulch, destroy weeds, and encourage growth.

TOMATOES UNDER GLASS.

Tomato-plants growing under glass will now be ripening their lower bunches. The leaves may be trimmed from below the ripening bunch. Make applications of liquid manure at frequent intervals, and now the houses are well filled with plant-growth see that ample ventilation is given in fine weather. The outside crop will now be well established. Suckering and tying should be done as soon as necessary, and in fine weather shallow cultivation given between the rows.

VEGETABLE-GROWING.

In the vegetable section the harvesting of the early crops of potatoes, peas, cabbage, and salads will be taking place. A handy second growth may often be taken from this cabbage crop with a little management. When the growth is well established give the land a dressing of nitrate of soda. As the ground becomes available prepare it for winter crops of celery, leeks, broccoli, brussels sprouts, and savoy cabbage, and autumn crops of peas and beans.

Those cabbage-plants now in seed-beds are often troubled with insect pests during dry weather. This trouble is best combated by sturdy growth and ample watering. In difficult cases apply a spray consisting of 2 teaspoonfuls Black Leaf 40, 2 oz. arsenate of lead paste, and 4 gallons rain-water. Dilute the ingredients in a small quantity of water, and dissolve them well before pouring them into the bulk. Mix well and apply the spray in dull weather when the plants are dry, covering well the under-side of the foliage where most insects feed.

Celery is a waterside plant delighting in a rich soil. For this reason it is usually grown in trenches of rich soil, where it may be readily given abundant irrigation. Trenches for this purpose should now be prepared; usually they are made about 2 ft. wide to accommodate a double row of plants. Open the trench out 18 in. or so in depth, place a good layer of well-decayed manure in the bottom, mixing it well with about an equal quantity of soil, topping off with 3 in. or 4 in. of soil alone. This should then form a shallow trench of the stated width. Water the plants well before setting them out. Lift them with plenty of soil, disturbing the roots as little as possible, and put out plants of an even grade. After planting, water the trench, and do not let it dry out while the crop is growing.

The useful, mild, and hardy leek is in general esteem during winter. It should be planted out now, as soon as the plants are ready, into a good rich soil. It is customary to drop the plants into holes made 5 in. or 6 in. deep with a dibber, the tops of the leaves just showing above the top. Afterwards fill the holes with water, which will wash down sufficient soil to establish the plants.

TOBACCO.

In the tobacco-fields, as soon as the ground crusts or shows a growth of seedling weeds put the horse-hoes through the crop on a fine day, working the land to only a shallow depth. This treatment should maintain the necessary sturdy growth that is required. When the majority of the plants show flower-buds at the terminal the crop

should be topped—that is, the terminal bud removed by pinching it out. This act maintains that growth and vigour in the leaves which would otherwise be absorbed by the blossoms.

Preparations for the harvest and curing the crop should now be made. A supply of 4 ft. curing-sticks will be needed, and materials for rafters on which to hang them. Arrangements should be made to clear right out the sheds that are to be used, so that the most may be made of the usually limited space available. The ample but controlled ventilation required to properly carry out this operation is usually satisfactory as far as the lower portion of the building is concerned, but the upper portion under the roof is often far too close. To enable a free draught to be obtained there when necessary, ample ventilation should be put in the roof or gable ends.

—*W. C. Hyde, Horticulturist.*

THE CATTLE-TICK.

THE subject of ticks affecting cattle in the Dominion is dealt with in the annual report of the Live-stock Division for 1924–25 as follows:—

Auckland Stock District: While this pest has not shown much, if any, diminution in the districts known as A area, no apparent increase has taken place in B area, and on the whole fewer ticks were in evidence. In Matamata and Cambridge districts, where ticks were in previous years known to exist, no evidence of their presence was found during the past season. In all cases where ticks were found in B area, and on two farms immediately south of the boundary where ticks were reported, control methods were carried out with the willing co-operation of the settlers concerned. The control of the tick within the A area is a difficult proposition, owing to the conditions and the difficulty there would be in any attempt at weekly dipping or spraying of other than dairy cattle. Settlers in this area do a great deal of tick-destruction, but more individual and collective action is needed in order to effectively combat these parasites. Means additional to dipping and spraying are within the power of settlers, and, if practised systematically, would materially assist to reduce the pest. It is very noticeable that in open country where ground-cover is not afforded by long, coarse grass, rushes, &c., ticks are not present at all, or, if occasionally seen, do not increase. This applies also to the North Auckland area, while in the Waikato the tendency is to diminution.

Wellington Stock District: Unfortunately, the presence of ticks was reported from Waitara (Taranaki) in December last, having been found on a cow owned by a small settler there. Investigations were immediately instituted, with the result that ticks were found on other small properties, all in close proximity to the area where they were first discovered. A comprehensive examination of all stock within a radius of from two to three miles was made, with the result that a single tick was found on an animal distant about half a mile from the original outbreak, but it is satisfactory to record that, although a strict examination of stock has been carried out, no further ticks have been discovered. With a view to eradicating the ticks from the district, the small areas involved have been unstocked, and wherever possible all cover has been destroyed and burnt. An area embracing the Waitara Borough and surrounding properties has also been proclaimed a quarantine area within which the movements of all stock are controlled.

The indications are that these ticks are not likely to be troublesome outside those portions of the northern area where hot-weather and plenty of ground-cover conditions are suitable for them. Notwithstanding this, the restrictions against their spread are being thoroughly enforced.

Commercial Orchards.—The total area in commercial orchards in New Zealand is approximately 30,000 acres, of which about 75 per cent. consists of apples.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

LAMENESS IN LAMBS AFTER DOCKING.

J. M. BARR, Jun., Makarau :—

We have had a good deal of trouble lately with lame lambs, the greater number of cases occurring after docking and among wether lambs. The lameness is not caused by foot-rot, but I have been told that it is some form of arthritis. I should be grateful for advice.

The Live-stock Division :—

We have observed instances of this trouble in lambs this season. The lameness is apparently not due to arthritis, as no evidence of enlarged joints was noted, and if arthritis were the cause it would certainly be detected by a swollen, painful condition of the joints, more particularly the hock, knee, and stifle. When arthritis is present in lambs very little can be done by way of cure; pain may be alleviated by gently rubbing the affected joint with belladonna liniment. Occurring after docking and castration, it is more probable that the stiffness or lameness is the result of microbial infection through the operation wounds, and this was undoubtedly the cause in the cases which came under our notice. Prevention lies in marking lambs on clean ground—avoiding operating in yards which are regularly used for the drafting of sheep. Strict attention should be paid to proper sterilization by boiling all instruments before use. Antiseptics should be freely used, and the swabbing of the operation wounds with disinfectant solution will ensure that no infection occurs.

PLANTING MUSHROOM-SPAWN.

"ST. ALBANS," Christchurch :—

I would be pleased if you could inform me how mushroom-spawn should be planted in a lawn—(1) time of season, (2) depth, (3) fertilizer or manure that would be most beneficial, (4) size spawn should be broken into.

The Horticulture Division :—

Mushroom-spawn is best planted in pasture about midsummer. The method is as follows: Remove a turf about 12 in. square and 3 in. deep, then 4 in. or 5 in. of soil, and in place of the soil tamp firmly some stable manure containing a piece of spawn about 3 in. by 2 in. Replace the turf and beat it firmly into place. The stable manure used should be fresh and in an even moist state of fermentation, such as that used for building a hot-bed.

GRUB ATTACKING RUSHES.

J. B. GUTHRIE, Ruahine :—

I am forwarding a few rush-stalks which contain grubs feeding on the core. Could you tell me what the grub is, and whether harmless or not? I became interested in it while burning off dead rushes in a valley on my farm, as I found them so generally infected, and am inclined to think the grub has accounted for the general dying-out of the bushes, making it possible for me to burn and clean up my pasture.

The Fields Division :—

The grub boring in the pith of the rushes is of common occurrence throughout New Zealand. It is the larva of a native moth named *Glyphipteryx iocheaera*. Some seasons the infestation is so prevalent that considerable areas of the host plant are killed above ground, and this certainly would assist burning. At times, however, the attacks are by no means so severe. This fluctuation is due to a hymenopterous parasite being more abundant some seasons than others.

MEAT SLAUGHTERING AND SELLING BY FARMERS.

"SETTLER," Upper Takaka :—

Please inform me if it is necessary that I should have a slaughtering license. I kill three sheep and a beast a week and sell to the neighbours.

The Live-stock Division :—

If your total weekly slaughterings are only three sheep and one cattle-beast there is no necessity for you to take out a slaughtering license, providing you are a *bona fide* farmer whose ordinary farming operations include the raising and fattening of stock, and that your farm is not situated inside or within three miles of a borough or town district, and that none of the meat from stock slaughtered by you is bartered or sold anywhere to a butcher, or anywhere inside or within three miles of a borough or town district. You are also required to keep a faithful record of all stock slaughtered and of the persons to whom they are bartered or sold, and to at all times have such record open to inspection by an Inspector. It is also necessary that all slaughtering of stock and handling of the meat be done under sanitary conditions. The Slaughtering and Inspection Act provides that every slaughtering-place, &c., shall at all times, to the satisfaction of the Inspector, be kept efficiently lighted, ventilated, cleansed, drained, and provided with a sufficient water-supply, and no offal, filth, or refuse is allowed to remain therein more than twenty-four hours. A *bona fide* farmer who can comply with these conditions is allowed to slaughter for barter or sale in any week stock not exceeding one head of cattle and five head of other stock.

ERADICATING TWITCH ON SMALL FARM.

"COUCH-GRASS," Appleby :—

Could you advise me as to the best way to clean ground of couch-grass? It extends about 4 in. to 6 in. under the surface. The ground is good river-soil and easily worked.

The Fields Division :—

The particular type of twitch with which your land is infested is brown-top (*Agrostis tenuis*). This is a difficult grass to eradicate in your country. As your farm is a small one you will be unable to adopt the expensive method of summer fallowing. After the ground has been ploughed, use the cultivators and harrows alternately and repeatedly. If it suits your convenience some such smother-crop as oats and tares for cow-feed should then be sown. After each cultivation the creeping stems of the couch should be raked up and burnt. If you sow the paddock down next March with a permanent misture of good English grasses your practice should be to top-dress this pasture annually in May or June. After a year or two brown-top will begin to make its appearance in the winter. During the flush of the year and throughout the summer, in response to the winter top-dressing, English grasses will oust the brown-top.

FERN-ROOT AND BURNT BONES FOR PIGS.

J. M., Waiuku :—

Would you kindly inform me regarding the value of fern-root as a food for pigs, also that of burnt bones?

The Live-stock Division :—

Fern-root is an excellent food for pigs, and gives the best results when fed in conjunction with dairy-products such as skim-milk, whey, or buttermilk. Green forages—rape, peas, clover, oats, and maize—may be given as a change from the fern-root. The exercise in rooting the fern is also very beneficial. Burnt bones have a value in feeding on account of their lime content. They should be ground up and fed with the liquid foods. Lime is necessary for body-construction and building up the frame, and should always be provided in some form.

DESTROYING CONVOLVULUS AMONG FRUIT-TREES.

"WOODLANDS," Dannevirke :—

Will you kindly advise me the best way to kill convolvulus which is growing thickly among fruit-trees? The ground is dug up every year, but in the spring comes up in a solid mass of convolvulus, which climbs the trees. The use of salt has been suggested, but I am afraid it may hurt the trees.

The Horticulture Division :—

The best method that can be advised is by no means an easy one. As your ground is dug over every year it would be advisable at that operation to pick out as much of the root as possible, and afterwards maintain a clean fallow, either by hoeing or, better still, by digging up the weed as soon as it commenced to make growth. In a very wet season or locality a smothering green crop, such as a thick sowing of peas, is a useful aid in accomplishing the task. As you suggest, strong chemical weed-killers could not be used without killing, or at least seriously damaging, the trees.

HARVESTING BROWN-TOP SEED.

F. HUTCHINSON, Tolaga Bay :—

I have some acres of brown-top which I propose harvesting this year. Not having had any experience in handling this crop, I would be obliged for any advice you could give me. The ground is too rough for machinery.

The Fields Division :—

It is extremely questionable whether it will pay you to harvest a small area of brown-top where machinery cannot be used. Farmers' dressed seed is not realizing a high price, and we should advise against cutting unless you intend using the seed yourself. The only method you could employ would be harvesting by sickle and flailing by hand.

CATTLE MARROWS AND PUMPKINS.

"READER," Gisborne :—

Which do you consider has the best feeding-qualities, the cattle-marrow or the cattle-pumpkin? The marrow is the large variety, equally as big as cattle-pumpkin. Is there any danger in feeding marrows or pumpkins to cows in the winter-time prior to calving? I am saving the seed of the marrows, and as they were grown alongside the pumpkins I should like to know if they would be hybridized by the latter.

The Fields Division :—

It is considered that good-quality pumpkin, such as Ironbark, has a higher feeding-value than the marrow. It has been noted that where pumpkins and marrows have been growing in the same field, stock neglect the marrows until the pumpkins are all gone. So far as keeping-qualities are concerned, the marrow is not very good, whereas pumpkins can be used right through winter. Marrows mature more quickly, and for this reason can be grown where pumpkins would fail. So far as can be ascertained, there is no danger in feeding them to cows at any time. Where the two crops are grown close together there is a probability of cross-fertilization taking place.

PHOSPHATES OR BONEMEAL FOR COWS.

J. H. SHERRARD, Otaua :—

Is the feeding of minerals to heavy-producing cows good practice? If so, what would you recommend? I have heard of bonemeal being used, but I hardly like to use it for fear of diseases.

The Live-stock Division :—

The supplementary feeding of minerals to cows should not be necessary if a properly balanced ration, and pasture on soil not deficient in essential elements,

are available. But, as it is well known that many soils are deficient in certain elements necessary for proper animal-nutrition—notably calcium phosphate—the replacement of this by feeding bonemeal, &c., becomes almost a necessity in conjunction with the proper manurial treatment of the soil. Feeding sterilized bonemeal can do no harm, and is most valuable when fed to cows some time before calving and for a month following. At this period the drain on the cow's system is considerable, and, if not replaced, will manifest itself in one way or another.

SELF-SOWN OAT CROP.

"High Country," Moawhango :—

Immediately after stacking my oats last year I ploughed the stubble in, and have a fairly good crop of self-sown oats growing which I intend to leave. What manure do you advise me to top-dress it with? With last year's crops I sowed 2 cwt. of grain manure. Do you consider it a good plan to sow grass-seed at the same time as top-dressing, so that when the oats are cut the grass may come away?

The Fields Division :—

If the self-sown oats show signs of standing still it would be advisable to give them a dressing of some quick-acting manure—say, superphosphate—at the rate of 2 cwt. per acre. This should move them on and bring them to maturity with a better yield of fodder. With regard to the surface-sowing of grass-seed at the same time, this is not recommended, as the seed-bed would be very rough, and a great waste of seed would result.

TREATMENT FOR LICE ON PIGS.

S. G. Ker, Thornton :—

Would you kindly let me know of a cheap and easily applied remedy for lice on pigs?

The Live-stock Division :—

Kerosene, one part, shaken up in two parts of linseed-oil, and applied to the skin with a brush, is very effectual in the destruction of lice on pigs. It should not be applied when the animals are exposed to sunshine. To effectually kill all eggs and lice which may develop from remaining eggs, it is essential to repeat the treatment three times at intervals of seven days. Sties must be thoroughly cleaned and sprayed with a strong solution of disinfectant, and afterwards lime-washed. All litter, &c., should be burnt.

STRAWBERRY, SUBTERRANEAN, AND SUCKLING CLOVERS.

"Settler," Raetihi :—

I should be glad to have any information about subterranean clover, suckling clover, and strawberry clover. Which are the most permanent and best for sowing on fern and manuka burns, or on bush burns on country likely to revert to fern and manuka? I find that subterranean clover is priced at about 7s. 6d. per pound, and suckling clover about 6d. per pound. I do not know the price of strawberry clover. Which would you recommend sowing on ploughed country (medium loam)?

The Fields Division :—

Strawberry clover is the most permanent clover of those you mention, and does well on low-lying land near the coast, but is hardly likely to be of much value in your district. Subterranean and suckling clovers are both annuals which reseed themselves each year, and consequently soon spread. Both are useful for sowing on fern and manuka burns in conjunction with other grasses. On such country about 1 lb. suckling clover and 4 oz. subterranean clover per acre may be suitably sown. For medium loam ploughable country it would be preferable to sow white clover and cow-grass—say, 1 lb. of the former and 2 lb. of the latter. The addition of 4 oz. subterranean clover and 8 oz. suckling clover would help, especially as stock grazing on it might carry some of the seed to the hills.

THE BRITISH MARKET FOR HOPS.

REPORTS received lately from the High Commissioner, London, indicate that the position on the British market, so far as New Zealand hops are concerned, is not favourable. The position at the termination of control, on 15th August last, is summed up in a note prepared by the Ministry of Agriculture (England), as follows :—

"At the termination of control the Hop Controller had in his bond approximately 20,000 cwt. of Dominion hops, of which about one-third would be New Zealand hops and the remaining two-thirds British Columbian. These were held in bond until the Controller's regulations (with regard to the disposal of the English crop, &c.) had been complied with, but, of course, they are now quite free.

"In addition to these Dominion hops there were also about 100,000 cwt. of foreign hops in the Controller's bond, and about 100,000 cwt. of English 1924 hops remained unsold. Brewers have been buying heavily this year, and are known to have considerable stocks of unused hops. It would probably be safe to say that there are enough hops in the country at the moment to supply brewing needs for about a year without counting the crop in the gardens which will be gathered this autumn.

"We do not think that in normal years the market here for Dominion hops is likely to be a very large one. The English brewer, we believe, is well content to use English hops for the bulk of his manufacture. A certain proportion of foreign hops is generally used, which until latterly might be taken as being about one-third of the total quantity used, or, say, 100,000 cwt. to 150,000 cwt. Generally speaking, what is sought are the somewhat stronger Pacific Slope hops or the better-quality Bohemian varieties.

"New Zealand hops coming to this country suffer disadvantages in two directions: they arrive at a time when the demand for hops is very slack, and the long journey through the tropics generally brings about a noticeable deterioration in their quality. These considerations lead us to think that the English market will never, so far as can be seen, absorb large quantities of New Zealand hops, while at the present time the market is so overstocked that further imports from New Zealand could hardly be expected to get a ready sale."

IMPORTATIONS OF FERTILIZERS: SEPTEMBER QUARTER.

FOLLOWING are the importations of fertilizers into New Zealand for the quarter ended 30th September, 1925: *Sulphate of Ammonia:* From Australia, 535 tons. *Gypsum:* Australia, 1,402 tons. *Nitrate of Soda:* Australia, 35 tons; Chile, 25 tons. *Basic Slag:* United Kingdom, 3,623 tons; Belgium, 1,035 tons; France, 150 tons; Germany, 20 tons. *Bonedust:* India, 800 tons; Australia, 100 tons. *Phosphates:* New Caledonia, 1,901 tons; Seychelles, 4,331 tons; Nauru Island, 22,646 tons; United Kingdom, 20 tons; Egypt, 7,037 tons. *Kainit:* United Kingdom, 90 tons; Belgium, 55 tons; France, 348 tons; Germany, 155 tons. *Muriate of Potash:* France, 10 tons. *Sulphate of Potash:* United Kingdom, 15 tons; Belgium, 15 tons; France, 180 tons; Germany, 85 tons. *Potash, other:* United Kingdom, 45 tons; France, 495 tons; Germany, 220 tons. *Sulphate of Iron:* Australia, 21 tons.

Milk-sediment Testers.—During the past year new patent sediment-testers were supplied to all Inspectors of the Agriculture Department carrying out inspection of dairies in the chief centres, and these have been found of considerable value in their work.

Registration of Plant Nurseries.—During 1924–25 a total of 587 nurseries were registered and inspected by the Horticulture Division, which reports that nursery stock generally was found to be in good condition and comparatively free from disease. Registration fees collected amounted to £591 10s.

WEATHER RECORDS: OCTOBER, 1925.

Dominion Meteorological Office.

GENERAL SUMMARY.

CONDITIONS during the first week of the month were in keeping with the weather experienced during the winter and the first month of spring; but, on the whole, October, which is regarded as the second month of the spring season, was a great improvement, and favourable to growth.

Westerly winds predominated, and five westerly disturbances were experienced, only one of which, however, was of much intensity. This storm passed in the south between the 13th and 15th, causing heavy winds and considerable rain, especially in the southern districts.

Anticyclonic conditions prevailed over the whole of the Dominion during the last week of the month, with fine sunny days and cold frosty nights, particularly about the 28th and 29th, when much tender growth was bitten by frost in several parts of the country.

Rainfall was below the average in most parts of the country, the exceptions being in the Nelson and Central Otago districts, which experienced from 20 to 90 per cent. above their average rainfalls. Most other parts of the country were below the average for October to the same extent.

—D. C. Bates, Director.

RAINFALL FOR OCTOBER, 1925, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	2·84	17	0·64	4·48
Russell	4·65	14	1·50	3·27
Whangarei	3·13	16	0·81	4·58
Auckland	2·03	19	0·31	3·63
Hamilton	3·35	22	0·48	4·82
Kawhia	3·54	18	0·44	5·28
New Plymouth	4·39	20	1·01	5·47
Riversdale, Inglewood	7·96	21	1·20	10·37
Whangamomona	6·00	20	1·08	9·11
Tairua, Thames	3·97	12	1·60	6·89
Tauranga	3·93	19	1·34	5·31
Maraehako Station, Opotiki ..	4·54	15	0·98	5·50
Gisborne	1·49	10	0·93	2·84
Taupo	2·31	15	0·86	4·28
Napier	1·17	10	0·54	2·50
Maraekakaho Station, Hastings ..	1·19	12	0·43	3·09
Taihape	2·57	13	0·39	4·30
Masterton	1·69	19	0·25	3·34
Patea	2·62	19	0·61	4·11
Wanganui	2·23	12	0·77	3·65
Foxton	0·67	7	0·18	3·03
Wellington	5·65	18	1·62	4·13
South Island.				
Westport	7·33	20	1·15	6·97
Greymouth	7·36	17	1·30	10·66
Hokitika	10·56	16	2·29	11·88
Arthur's Pass	14·59	13	4·50	20·99
Ross, Westland	13·47	13	2·58	15·16
Collingwood	12·54	21	2·94	11·03
Nelson	6·61	17	2·16	3·48
Spring Creek, Blenheim	2·67	14	0·70	2·39
Tophouse	6·87	18	0·82	5·80

RAINFALL FOR OCTOBER, 1925—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
South Island—continued.				
	Inches.		Inches.	Inches.
Hanmer Springs	2·50	15	0·44	2·66
Highfield, Waiau	1·44	8	0·42	2·46
Gore Bay	1·01	9	0·28	1·80
Christchurch	1·67	7	0·78	1·65
Timaru	0·90	11	0·26	1·97
Benmore Station, Omarama ..	1·72	9	0·40	2·09
Lambrook Station, Fairlie ..	1·74	10	0·70	2·00
Oamaru	1·24	8	0·37	1·66
Queenstown	3·48	12	0·97	3·60
Clyde	2·70	8	1·70	1·58
Dunedin	2·22	13	0·58	3·03
Wendon	3·10	9	1·23	2·50
Invercargill	3·24	14	0·86	4·57

INVENTIONS OF AGRICULTURAL INTEREST.

APPLICATIONS for patents, published with abridged specifications in the *New Zealand Patent Office Journal* from 24th September to 5th November, 1925, include the following of agricultural interest:—

No. 52715: Milk-agitator; C. B. Dent, Christchurch. No. 54048: Animal-trap; B. P. Priest and others, Kinver, England. No. 54223: Milking-machine teat-cup; B. D. Holmwood, Masterton. No. 54302: Sheep-shearing-machine comb; F. G. W. Bristow, Sydney, N.S.W. No. 54492: Fruit-picking device; T. R. W. Wright, Christchurch. No. 52376: Milking-machine; S. J. Avery, Sanson. No. 53081: Animal-controller; P. T. Fromm, Walton. No. 54088: Churn; J. O'Connell and H. H. Kerr, Kensington, Vic. No. 54224: Milking-machine vacuum-control device; B. D. Holmwood, Masterton. No. 52090: Milk sampling and weighing apparatus; J. J. Raynes, Rukuhia. No. 52666: Fencing-post; H. W. and L. A. James, Waipawa. No. 52924: Plough-spring coulter-clamp; H. E. Thew, Timaru. No. 54175: Milking-machine teat-cup; R. McIntyre, Palmerston North. No. 54180: Harrow; P. and D. Duncan, Ltd., Christchurch. No. 54617: Pig-house; A. J. Palmer, Palmerston North. No. 54633: Animal dry feeder; A. J. Palmer, Palmerston North. No. 54662: Agricultural-implement forecarriage support; M. J. Hooper, Auckland. No. 52395: Lime and fertilizer distributor; J. A. Storrie and J. W. Willett, Invercargill. No. 52932: Plough-lifting means: J. I. Carter, Waipawa. No. 53029: Plough; P. and D. Duncan, Ltd., Christchurch. No. 53895: Weed-destroyer; W. F. Stewart, Tamahere. No. 54235: Animal-trap; H. L. Mainland, Dunedin. No. 54743: Milk-can; H. Meister, Sydney, N.S.W. No. 54762: Wire-bound box; R. P. Park, Melbourne.

Copy of full specifications and drawings in respect of any of the above may be obtained from the Registrar of Patents, Wellington. Price, 1s.

Destruction of Wild Pigs.—The State Forest Service *Newsletter* for September states: "During the lambing season the stream of claims for payment of royalty on wild pigs killed has been heavy and continuous. We are now operating over the whole of Taranaki, the Wanganui River locality, and the Ruatiti-Raetihi locality, between the Main Trunk line and the Wanganui River. Some twenty prominent settlers in convenient locations act as collectors of snouts on behalf of the Service, and are periodically visited by the district Forest Ranger.

THE SEASON'S LAMBING: NORTH ISLAND ESTIMATE.

FROM information furnished by the Inspectors of Stock in the various districts the average lambing for the current season in the North Island is estimated at 85·64 per cent. With 7,463,735 breeding-ewes in the North Island, as shown in the 1925 sheep returns, the number of lambs is estimated at 6,391,812. South Island and Dominion estimates will appear in next month's issue.

ESTIMATED AREAS UNDER WHEAT AND OATS.

THE following estimates of the areas under wheat and oats in the Dominion for the current season have been issued by the Government Statistician at date 27th October, the figures being based on the usual card census: Wheat—North Island, 2,600 acres; South Island 157,400 acres: total 160,000 acres. Oats—North Island, 35,000 acres; South Island, 350,000 acres: total, 385,000 acres. The corresponding final totals for the previous season (1924–25) were 169,094 acres of wheat and 472,315 acres of oats. In the current season's wheat-sowings the areas under the different varieties are given as follows: Tuscan or longberry, 116,247 acres; Hunter's (various), 21,467 acres; Velvet or Pearl, 8,043 acres; balance unspecified.

FORTHCOMING AGRICULTURAL SHOWS.

Thames Valley A., P., and H. Association: Te Aroha, 24th and 25th November.
Stratford A. and P. Association: Stratford, 25th and 26th November.
North Otago A. and P. Association: Oamaru, 26th and 27th November.
Wyndham A. and P. Society: Wyndham, 4th December.
Auckland A. and P. Association: Auckland, 4th and 5th December.
Waipukurau A. and P. Association: Waipukurau, 22nd January, 1926.
Horowhenua A. and P. Association: Levin, 26th and 27th January.
Rodney Agricultural Society: Warkworth, 6th February.
Dannevirke A. and P. Association: Dannevirke, 10th and 11th February.
Pahiatua A. and P. Association: Pahiatua, 13th February.
Masterton A. and P. Association: Solway, 16th and 17th February.
Taumarunui A. and P. Association: Taumarunui, 17th February.
King-country Central A. and P. Association: Te Kuiti, 18th February.
Northern Wairoa A. and P. Association: Mititai, 20th February.
Tauranga A. and P. Association: Tauranga, 26th February.
Franklin A. and P. Association: Pukekohe, 26th and 27th February.
Omaha and Pakiri A. and H. Association: Leigh, 27th February.
Taranaki Metropolitan Agricultural Society: New Plymouth, 3rd and 4th March.
Mayfield A. and P. Association: Mayfield, 20th March.
Temuka and Geraldine A. and P. Association: Winchester, 25th March.
Methven A. and P. Association: Methven, 27th March.

Agricultural and Pastoral Association Secretaries are invited to supply dates and location of their shows for publication in the "Journal."

Area under Potatoes.—The Government Statistician estimates the area under potatoes this season (1925–26) as 5,000 acres in the North Island and 17,500 acres in the South Island, or a total of 22,500 acres. The corresponding final figures for the 1924–25 season were 5,214, 17,878, and 23,092 acres respectively. Only holdings of 1 acre and over outside borough boundaries are covered by these figures. A fair aggregate area of potatoes is grown on the smaller holdings and within boroughs.